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PINNIPED STUDIES CONDUCTED AT SAN CLEMENTE ISLAND, CALIFORNIA DURING 1983

By

Charles W. Oliver, Mark S. Lowry and Lisa M. Firm

ADMINISTRATIVE REPORT LJ-88-08

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PINNIPED STUDIES CONDUCTED AT SAN CLEMENTE ISLAND, CALIFORNIA, DURING 1983.

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INTRODUCTION

The California sea lion (Zalophus californianus), northern elephant seal (Mirounga angustirostris), and harbor seal (Phoca vitulina richardsi) breed at San Clemente Island (SCI) and other islands off the southern California coast. The National Marine Fisheries (NMFS) began monitoring of population trends for all three species at SCI in August 1981, and initiated a study of the feeding habits of the California sea lion. The results of our study from August 1981 through December 1982 were presented in a previous report (Oliver and Lowry, 1987). In this report we present information collected during calendar year 1983 on: 1) seasonal distribution and numbers of these species, 2) California sea lion feeding habits from scat and spewing analysis, 3) dead marine mammals, and 4) tagged sea lions and northern elephant seals.

SCI is the southernmost and third largest United States-owned island in the southern California Bight (SCB). It is administered by the Department of the Navy, Naval Air Station at North Island, San Diego, California, and is used primarily for military operations. Our study area was located on the southwest coast extending from Seal Cove Point to "The Shack" (Figure 1), a linear distance of approximately 7.5 km. We divided this area into three unequal sub-areas: 1) North of Mail Point (NMP; 4.0 km), 2) Mail Point (MP; 0.5 km), and 3) South of Mail Point (SMP; 3.0 km) (Figures 2-3). Data were less frequently collected between "The Shack" and Lost Point (a linear distance of approximately 3.5 km). The study area is characterized by a cactus and rock terrain above haulout and rookery areas. Haulout areas include rocky points and beaches as well as seven dirt covered flat areas above a cobblestone or rock shoreline.

METHODS

Counts and Distribution of Pinnipeds

We obtained complete counts of sea lions and elephant seals during two-day census periods. Counts were generally made from Seal Cove Point to MP on one day, and continued from Mail Point to Arch Rock the next day (Figures 1-2). Complete counts required observations from atop MP (Figure 3). If we did not ascend MP, counts were considered incomplete although we made efforts to ascertain the presence or absence of animals at these areas from other locations. We censused pinnipeds using 7x50, 9x30, or 10x50 binoculars, and were able to approach to within 30 meters or less of most of the animals while remaining concealed behind terrain features. However, some areas were censused at much greater distances, primarily the offshore rocks near Seal Cove Point, Tiki Head Beach, and at a harbor seal haulout at "The Shack" (Figure 2). We occasionally disturbed some animals during the peak of the pupping season in July while obtaining a complete count of sea lion pups, and during tagging efforts in March for elephant seals and in September for sea lions. Beginning in April, we recorded our field observations on forms traced from aerial photographs of the study area (Appendix I).

We categorized animals to age-classes whenever possible. California sea lions were counted as either pups (young-of-the-year) or non-pups. Animals born during the summer of 1982 were counted as 1982-pups through May of 1983, after which they were counted as non-pups. We counted pups of the 1983 cohort beginning with the first observation of a live animal from this cohort. Non-pups consisted of adults, subadults, and juveniles. We counted adult males (defined as those defending territory) during July of 1983. Northern elephant seals were classified as adults, subadults, juveniles, yearlings, or pups. Counts of harbor seals at "The Shack" were obtained using binoculars from a distance of approximately 100 meters. We classified harbor seals as either pups or non-pups.

California Sea Lion Feeding Habits Study

We collected California sea lion scats and spewings in all three sub-areas. Most of our samples were obtained at MP and SMP, generally during midday after the animals had moved closer to the water's edge. Scats and spewings were individually bagged, labeled, and then frozen until analyzed. We cleared some haulouts of all uncollected scats and spewings during each trip thereby defining a time frame for samples found on the next trip. In the laboratory, scats and spewings were individually soaked in water and liquid detergent for three to five days and then sifted through a series of three screens to retrieve remains of prey items. The screens contained mesh sizes of 2.8mm, 1.4mm, and either 1.0mm (January-March) or 0.710mm (April-December), respectively. These prey item remains (fish otoliths, cephalopod

beaks, fish teeth, and cartilaginous vertebrae) were then used to identify sea lion prey (Lowry 1986; Lowry and Oliver 1986). Cephalopod beaks were stored in ethanol. Otoliths and other hard parts were air dried and stored in vials.

We primarily used otoliths and cephalopod beaks to identify prey items. The prey hard parts that exhibited characteristics similar to those of a particular prey but were either too digested or broken to be positively identified were categorized as a probable identification. Percent frequency of occurrence (PFO) was calculated for all positive and probable identifications from prey items found in California sea lion scats (Lowry and Oliver 1986). PFO, defined as the percentage of scats and spewings yielding a particular prey, was calculated only for scat and spewing samples which contained at least one prey item. The PFO total of all prey will not generally equal 100% because more than one prey can occur in each scat. Scat and spewing data were entered into the SWFC computer database SCATDB.DAT.

Salvage of Dead Marine Mammals

We salvaged dead marine mammals whenever possible within the study area, and during three beach surveys from Lost Point to the Shack. Salvage effort was secondary to census and scat collection and generally occurred in areas where live animals were not immediately present. To reduce the amount of disturbance to live animals, we generally did not examine dead animals in most of the MP area, nor on the beaches below the "Uppers" in the area SMP (Figure 2). We noted all observed dead animals at these locations, whether or not we salvaged the carcasses. All accessible marine mammal carcasses were marked with red surveyor's tape so that carcass would not be mistaken for a recent stranding during subsequent trips. Specimen parts were collected from dead California sea lions including the foreflippers from freshly dead pups for osteological studies (Watson, Stewart, and Ganey, 1986), and teeth for a sex determination study (Lowry and Folk, 1986). Data were recorded on a pinniped life history data form and entered into the SWFC Pinniped Life History database PINNLIFE.DAT.

Tagging and Resights

We tagged California sea lion pups under the authority of Marine Mammal Protection Act Permit 347 in mid-September of 1983, when the pups were approximately two to three months of age. Seven persons participated in the tagging operation on September 17-18, 1983. We stalked small groups or herded larger groups against the base of rock cliffs. Animals were then restrained by hand or in hoop nets while they were sexed and tagged after capture. White Dalton Jumbo Reise tags were placed on the posterior edge of both foreflippers close to the body. Data on the sex, location, tag number and color, pup weight, and general

physical condition were recorded for each animal. We recorded tag information on coding forms and entered these data into the SWFC computer database STAGDB.DAT.

We noted resights of previously tagged pinnipeds during each census. Tags were read using either 7 x 50, 9x30, and 10 x 50 binoculars, or a 20 x 45 zoom spotting scope. For each tagged animal observed we attempted to record the tag number, color, condition of tag, location of tag (left, right or both flippers) and the animal's age-class, condition, association and behavior. This information was subsequently coded and entered into the SWFC computer database STAGDB.DAT

Other Observations

We noted obvious disturbance to the animals whenever it was observed, as well as evidence of recent foot or vehicular traffic in an area likely to have caused disturbance. We also noted the presence of commercial, private, or military vessels and aircraft. Any occurrence of cetaceans offshore from the study area was also recorded, as was any apparent entanglement of pinnipeds with debris.

RESULTS

Counts and Distribution of Pinnipeds

We conducted ten ground surveys in the study area during 1983. Complete counts were obtained for California sea lions and northern elephant seals during six of the ten trips (Table 1). Harbor seals were observed at "The Shack" on four of the six trips we surveyed there, but were seen elsewhere in the study area on only one occasion. No live pinnipeds were observed on the beaches between Seal Cove Point and the "Small Cliffs", "Tiki Head Bridge Beach" and MP, and "Arch Rock" to "The Shack" (Figure 2). The offshore rock we called "The Notch" is located between "Tiki Head Bridge Beach" and MP. A few sea lions were seen there during the summer months, but it is awash at high tide. During three ground surveys of the rocky shoreline between "The Shack" and Lost Point, we did not observe any live pinnipeds. The severe storms which occurred during the winter of 1982-1983 markedly changed the shoreline within the study area. Previously vegetated areas were denuded and debris were deposited 20-30 meters farther inland than we had observed during 1981 and 1982.

We conducted four aerial surveys around the perimeter of the island during April, June, July, and October (Table 2). Harbor seals were seen between Lost Point and China Point during the April and May flights with a maximum estimate of 40 animals. No harbor seals or elephant seals were seen at any other location outside the study area. Sea lions were seen at the Northwest

Harbor Islet on all four flights with a maximum estimate of 200 in early June and a minimum of 13 in October. Four sea lions were seen on Castle Rock (Figure 1) in October.

California Sea Lions

Numbers of California sea lion pups and non-pups are presented for each of the three sub-areas in Table 1. Figure 4 presents the total numbers of sea lions counted within the study area, for all trips during which a complete count of the area was obtained. Figure 5 presents similar data for each of the three sub-areas. Figure 6 shows the ratios of 1983-cohort pups to the total numbers of California sea lions seen in the three sub-areas for the period May through December 1983.

The first live pups of the 1983 cohort were observed on May 13, 1983 with peak numbers of pups observed in late August, 1983 (378 pups). Our count in late July was 353 pups. We salvaged a single premature specimen on March 20, and four more in mid-April.

During late July the percentages of pups in each sub-area were 48.7 % (MP), 34.0% (NMP), and 17.3% (SMP). These percentages are quite different from the total numbers of all animals counted in the sub-areas (30.0%, 25.4%, and 44.6%, respectively). In December, MP contained 15.6% of all pups and 11.1% of the animals. NMP had 29.2% of the pups and 22.4% of all animals while SMP accounted for 55.2% and 66.5%, respectively. We did not record adult males defending territories until June, and then only at MP(3) and SMP (6). Total numbers in late-July were 11 (SMP), 12 (NMP), and 7 (MP).

Northern Elephant Seals

Elephant seals were observed within all three sub-areas but most animals were observed at MP (Table 1). Elephant seals were most abundant in April (44 animals), none were observed in February, July and August, and fewer than 11 animals were observed in March, June, and September. No elephant seals were seen during the late February trip, although 4 adult females and three yearlings or juveniles were observed at MP on March 18-20. No live adult males were seen and a single dead adult male was salvaged on March 19 approximately 500 meters north of Mail Point. The age-class distribution of elephant seals is presented in Table 3 for all ten trips.

Harbor Seals

The haulout to the south of Mail Point (The Shack), was the only location where harbor seals were consistently observed (Figures 1-2). We counted harbor seals during four of six trips at "The Shack" (Table 1). We obtained maximum counts there of 18

animals in mid-December and 16 animals in late July (Table 1). No count was obtained in February or April, and no harbor seals were seen there in March. A single pup was seen in the NMP sub-area during the March trip.

California Sea Lion Feeding Habits Study

We collected eight spewings and 440 scats from California sea lions during 1983 including 105 fresh scats and 335 dry scats (Table 4). The area SMP accounted for most of the samples since we were able to canvass this area during mid-day while the animals were at the water's edge. No prey remains were found in 52 (11.6%) of the samples and therefore these samples were not included in the PFO analysis. Of all otoliths, beaks and other prey remains which were categorized as either positive or probable identifications, 97.5 % were positively identified (Table 5a), and 2.5% were probable identifications (Table 5b). We identified 17 prey to species, 4 prey to genera, and 6 prey to family. Lowry and Oliver (1986) defined commonly occurring prey as those prey with PFO's of at least 10%. Six prey had a PFO value of at least 10%: northern anchovy (Engraulis mordax), 43.4%; pelagic red crab (Pleuroncodes planipes), 42.2%; rockfish (Sebastes spp.), 22.6%; Jack mackerel (Trachurus sysmmetricus), 21.3%; Market squid (Loligo opalescens), 16.6%; and Blacksmith (Chromis punctipinnis), 14.4% (Table 5a). These six prey constitute 76.7% of all prey that were positively identified in the sample.

Salvage of Dead Marine Mammals

We salvaged 80 California sea lions, 1 harbor seal, and 1 northern elephant seal (Table 6, Appendix II). 77.5% of the sea lion strandings were within the study area and represented 9 1982-cohort pups, 40 1983-cohort pups, and 13 non-pups. 22.5% of the sea lion strandings were found between Lost Point and "The Shack". Dead strandings of non-pups were salvaged on all but two of the ten trips, ranging in numbers from 1 to as many as 10. Counts of dead pups from the 1982 cohort were highest in April (7 pups) and May (4 pups). Dead pups of 1983 were more abundant in May (10 pups) and again in December (13 pups). We recovered 5 premature specimens from the 1983 cohort during March and April of the year. Eight of the animals we salvaged in November and December bore tags indicating that they were 1983-cohort pups from San Clemente Island, and one animal from the 1982 cohort was found dead in a monofilament gillnet just off Mail Point during July.

Tagging and Resights

San Clemente Island Animals

We double-tagged 145 1983-cohort California sea lion pups on

September 17-18, 1983 (Appendix III). All tagging occurred in the MP area where California sea lion pups were most accessible and abundant. This represents 41.1% of the 353 pups counted during the pup count in late July, and 45.6% of the incomplete count obtained just prior to tagging. More males (55%) were captured and tagged than females (45%)(Table 7), and 22.4% of the animals were categorized as in either fair or poor condition. The mean weight of male pups was 16.1 kg (N=70, SD=4.3) and is higher than the 13.6 kg mean weight for females (N=75, SD=4.0). These mean weights are significantly different using a t-test for samples with variances that are not unequal ($T_{0.05,130}=3.567$, $P<0.001$).

The percentages of pups observed with tags in the 1982 cohort varied during the period February through May: 8.8% in February, 5.8% in March, 10.7% in April, and 2.5% in May (Tables 1 and 8). During mid-December we counted 212 pups of the 1983-cohort and obtained resights of 34 live, tagged animals representing 16.0% of the pup count. Six tagged pups were found dead in December and two more had been salvaged in early November. Thus, 5.5% of the pups tagged in September 1983, were known dead by December.

A single male sea lion from our 1981 cohort (tag number 061) was observed alive on the Farallon Islands, California during October and November of 1983 (H. Huber, pers comm). These sightings represent a linear distance of travel of 362.8 nautical miles and occurred 781 and 789 days after the initial capture and release. This animal had also been seen there during the fall of 1982.

Three males (tag numbers 90, 108, 172) and three females (tag numbers 154, 202, 216), from the 1982 cohort of California sea lions, were also reported at locations along the California coastline during 1983. A male observed at SCI during April was seen 18 days later in poor condition near Monterey, California, representing a traveled distance of 341 nautical miles. Two other males were reported dead during June and July at distances of 58.7 NM to the East of San Clemente Island, and 191.1 NM to the North. All three females were seen between Oxnard and Point Arguello, California, at linear distances between 108 and 116 NM. A dead female from the 1982-cohort was salvaged from a monofilament gillnet off Mail Point at San Clemente Island 292 days after it had been released (tag number 198). A live male of this cohort (tag number 127) was seen at SCI during November.

Five males (tag numbers 223, 228, 264, 282, 308) and three females (tag numbers 257, 266, 323) from the 1983 cohort of sea lion pups tagged during September were found dead at San Clemente Island during 1983. No animals from this cohort were reported at other locations during late 1983.

Non-San Clemente Island Animals

Nine elephant seals and one sea lion were observed at SCI

but are known to have been tagged at other islands. The data for these observations are presented in Table 9, and represent young animals visiting San Clemente Island from San Nicolas, San Miguel, and Santa Barbara Islands. Eight of the ten sightings occurred during April and May, and all eight were elephant seals.

Other Observations

Disturbance Factors

The study area continued to be visited by persons unknown to us. We noted evidence of vehicular traffic within the area, including tire tracks on the haulouts to the north and south of Mail Point, as well as the rookery itself. We arranged the transport of a small shelter to the MP area during the spring. Between our July and August trips, this shelter was burglarized. The coastline was also visited by both commercial and private sportfishing vessels, and commercial abalone and lobster fisherman. On more than one occasion we observed lobster fishermen pulling traps within ten meters of animals on the rookery, and commercial abalone divers working in chest deep water near the haulouts. In one instance, a diver was observed collecting black abalone while walking the shoreline. We also observed low-flying aircraft (helicopters, prop and jet) flying over the haulouts and rookery at altitudes often less than a few hundred feet.

Cetaceans

We did not observe any cetaceans during our ground or aerial surveys in 1983.

Entanglements

We did not observe any entanglement of pinnipeds with debris, fishing gear, etc., during 1983. A female California sea lion from the 1982 cohort (tag number 198) was reported by a commercial fisherman who found the dead animal in a monofilament gillnet (halibut set net) set in 14 fathoms of water off Mail Point.

DISCUSSION

Counts and Distribution of Pinnipeds

California Sea Lions

Published counts for California sea lions at SCI have ranged from a high of 3,820 in 1964 (Odell 1971) to as few as 251 in 1928 (Bonnot 1928). We reported a maximum count of 2,292 animals during July 1982 and a minimum of 777 animals during May 1982, including estimates for the Northwest Harbor Islet (Oliver and Lowry 1987). Our July 1982 count included 941 pups.

We were unable to get to the Island during January due to a series of severe storms and did not obtain a complete count during the late February trip which also involved a storm. The incomplete count during February resulted from our inability to census the outer ledges at MP (an area where we have counted as many as 200 sea lions), but our count of 821 sea lions is less than 37% of the 1982 count (2,245) previously reported. We did not observe the influx of mostly non-pups during late-winter and early spring which we reported for February 1982, nor did we observe a precipitous decline in the number of sea lions during March through April as was seen during 1982. Monthly counts were generally equal for the period in 1983 (915-979 animals), but slightly higher than the May 1982 low of 697 animals. The peak count was obtained in late July and was approximately 73% of the 1982 count (2,221 animals). Our late July 1983 count of pups (353) was 37.5% of the count in 1982 (941 pups).

We previously reported that MP accounted for the greatest number of sea lions counted during our trips, and that there appeared to be a greater proportion of non-reproductive animals in the sub-area SMP. During 1983, we observed almost twice as many sea lions in the SMP area during the breeding season than at either the NMP or MP sub-areas. The ratios of pups to total animals for all three sub-areas were lower in 1983 than 1982, but maintained the ranking by sub-area we had observed in 1982, with MP producing the highest ratio and SMP the lowest. The percentage drop in the ratio of pups to total animals were greater than the drop in total animals. This is further evidence that pup production was reduced in 1983 and that the sub-area SMP was used by a greater proportion of non-reproductive animals. There was not a rapid decline in the ratio for the SMP area immediately after the breeding season as we observed in 1982. This may have resulted from the smaller number of animals in the area overall, or an earlier departure of non-reproductive animals.

Our aerial surveys indicate that California sea lions predominantly make use of the study area and the Northwest Harbor Islet. During the four aerial surveys we observed sea lions outside of the study area, at the Northwest Harbor Islet, on each occasion ranging in number from 13 to 200. A single animal was

observed near China Point and 13 were seen at Castle Rock during October. We estimated the maximum number of hauled-out California sea lions for the entire island to be 1,652 during July 1983 with a minimum estimate of 540 during December 1983.

Northern Elephant Seals

It is likely the severe storms which occurred during December 1982 through March 1983 affected the elephant seals at SCI. We did not observe a breeding group at MP during the February and March trips and no pups were seen during the year. We previously reported that the seals make use of a south-facing, cobblestone beach which is unprotected from heavy surf. We were unable to determine the cause of death for the adult male seal we salvaged during March near MP, but its presence may indicate that a breeding group was unsuccessful during 1983. With the exception of the breeding season, the numbers and seasonal distribution of elephant seals was similar to what we observed in 1982. No animals were seen outside of the study area during the aerial surveys of the entire coastline. Northern elephant seals do not appear to be well established at SCI and ,in fact, made little use of the island as evidenced by our maximum count of 44 animals seen during April 1983.

Harbor Seals

During the aerial flights in April and June, we observed more harbor seals between Lost Point and China Point (30-40 animals) than the maximum (18 animals) we counted at "The Shack". This suggests that this section of coastline may be utilized to a greater extent than our study area. We observed only one harbor seal pup during 1983, and this animal was in the NMP sub-area. No pups were seen at "The Shack", where we have consistently seen seals in the past. We continued to see seals at "The Shack" on most visits to the site which, indicates they make regular use of the haulout. Combining these observations provides an estimate of between 50-70 harbor seals which may make regular use of the island.

California Sea Lion Feeding Habits

Six prey taxa constituted 76.7% of the positively identified prey remains, and each had PFO's of at least 10%. Four of these prey, all of commercial value, were also common during the 1981-1982 period at San Clemente Island as we previously reported. However, the relative ranking by PFO's changed between 1981-82 and 1983. These four were: 1) Jack mackerel (48.3% vs 21.3%), 2) Northern anchovy (36.4% vs 43.4%), 3) Market squid (27.0% vs 16.6%), and 4) Rockfish (10.1% vs 22.6%). Pacific mackerel and Pacific whiting were both found during each period but at levels below 10% during 1983, and blacksmith also appeared during both periods but above 10% only during 1983. The appearance of pelagic

red crab is interesting in that it normally occurs off Baja California, Mexico but was abundant off southern California during 1983 (Stewart and Yochem 1984). As we reported previously, California sea lions appear to consume a wide variety of prey, but may require a relative few for nourishment. Whether or not a causal effect exists between the changes in prey consumption and the reduced numbers of California sea lions, lower pup production, and reduced mean pup weights, is unknown.

Salvage of Dead Marine Mammals

Our salvage efforts were opportunistic in that we were reluctant to disturb animals in order to get at a dead animal. The live animals also stayed very close to the shoreline, thus posing the possibility that some dead animals were washed to sea before we could detect them. Our results are therefore minimum estimates of the number of dead carcasses on the island. We salvaged roughly the same number of California sea lions in the study area during 1983 (62) as we reported for late-1981 and 1982 (71). However, the age-classes of the salvaged specimens changed considerably. During 1983 we salvaged 9 1982-cohort sea lions and 40 1983-cohort animals. The latter group represents half of all salvaged animals during 1983, whereas the 1981-cohort and 1982-cohort accounted for 22.1% and 25.3%, respectively, during the 1981-1982 period. By December, we had salvaged 8 of the pups we had tagged during September, representing 5.5% of the tagged individuals. None of the 1981 and only one of the 1982 tagging samples were salvaged through 1983. This suggests mortality was higher for the 1983-cohort of California sea lions.

Tagging and Resights

We observed a single California sea lion on the island which was known to have been born at Santa Barbara Island (Carolyn Heath, pers. comm.). The pup was seen in December at SCI, and is evidence that some movement occurs between these areas. Northern elephant seals also visit SCI from the other islands as evidenced by the seven young animals we observed during 1983 that were tagged at San Nicolas Island, and the two from San Miguel Island (Brent Stewart, pers. comm.).

1983-cohort California sea lions

Our count of 316 pups while tagging in mid-September of 1983 did not include all of the MP area, but is a better estimate of the number of animals alive in September than the late July count of 353. We tagged 46.0% of the available pups (145 / 316). During November and December we resighted 34 and 40 tags, respectively. Of the 34 resights in November, 32 were live animals, as were 34 of the 40 resights in December. The percentages of live pups observed with tags in November (16.8%) and December (16.0%) were roughly four times what we previously

reported for these months in 1981 (4.6% in November) and twice what we reported for 1982 (10.0% and 8.5% in November and December, respectively). However, the magnitude of the decline from mid-September to December, in the percentages of tagged animals, was about the same in 1983 when we tagged 46.0% of the available pups. During 1981 we had tagged 10.7% of all pups and 23.6% in 1982. The percentage of tagged pups in December has been approximately one half the September percentages for 1981, 1982, and 1983. This decline may indicate (1) a higher mortality of tagged pups, (2) some behavioral change induced by the tagging experience resulting in tagged pups being away from the island more often than untagged pups, (3) an influx of untagged pups from other rookeries, or (4) our inability to discern tagged animals. Evidence of movement away from the island by weaned pups was indicated by the sighting of four 1981-cohort yearlings at the Farallon Islands during September and October of 1982 (Huber et. al. 1983, Oliver and Lowry, 1987). None of the 1983-cohort were reported at locations other than San Clemente Island during the fall.

The mean weights for both male and female pups captured in 1983 were significantly lower than for the same period in 1982, with 1983 males weighing 75% of the 1982 mean weight and 1983 females averaging about 72% of the 1982 sample. A similar reduction in mean weights was reported for sea lions at San Nicolas Island (Heath and Francis 1984). In addition, 22.4% of the 1983 tagging sample were categorized as in less than "good" physical condition, whereas only 6% received this classification in 1982 and none in 1981.

The drastic reduction, from previous years, in the number of pups at SCI in late July, coupled with the lower mean weights in September and the greater number of salvaged, young animals, was probably related to the El Nino event which was occurring (McGowan 1984). We suggest that either a reduction in available prey in the vicinity of SCI, or a reduction in a "necessary" prey, resulted in a number of changes reflected in our observations. Adult females may have been in poorer physical condition, resulting in an increase in premature births, a decrease in pup weights at birth, a decrease in the quantity and quality of milk available for their young, and a decrease in the time spent suckling the young due to longer feeding forays (Heath and Francis 1984).

1982 cohort California sea lions

The percentages of tagged animals of this cohort ranged from a low of 2.5% in May to 10.7% in April. These values are not dissimilar to what we observed for the 1981-cohort in the spring of 1982. We did salvage a female from this cohort in July and observed a live male in November.

There were six animals from this cohort (3 males and 3 females) which were reported at locations other than San Clemente

Island in 1983. The females, all alive, were found along the mainland coast to the north of the island, but south of Point Conception, California. Two of the males were found dead south of Point Conception. The lone male seen near Monterey, California, was in poor health. All of the live animals were cared for at rehabilitation centers and subsequently released. We believe these strandings resulted from poor health brought on by a lack of prey.

1981 cohort of California sea lions

None of the 1981 tagged animals were sighted at San Clemente Island during 1983, and the single male reported at the Farallon Islands in both October and November of 1983 represents the only record for this group of which we are aware. This animal had also been seen at the Farallons during the fall of 1982.

Other Observations

Disturbance

The study area continued to be visited by island personnel and there were commercial and private fishing vessels in the immediate vicinity during each of our trips. It is unclear to us what effect, if any, these events have on the pinnipeds.

ACKNOWLEDGEMENTS

We would like to thank Jan Larson (Staff Civil Engineer, Natural Resources Program, Dept. of Navy) for logistical support during our field activities, Tony Guerro and Dave Butler (the Transportation Department) for the use of Navy vehicles in the field, and Ted Vankirk and Bob Hodges (Dept. of Navy) for alleviating logistic problems associated with access to our study site. We are also grateful to the many persons (SWFC, Southwest Region-NMFS, Staff Civil Engineer, and contracted personnel) who assisted in the field during pinniped surveys and tagging: S.Hawes, J. McDermott, L. Patla, J. Scholl, D. Seagars, J. Wexler, and P. Wolf. The California Department of Fish and Game provided the aircraft we used to survey the entire island. We thank their pilot/warden L. Heitz for getting us there and back. Jeanne Wexler assisted with the compilation of some of the tables and appendices. We thank Roy Allen for his illustrative services and Cliff Ratcliffe for final preparation of this manuscript.

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Table 1. Numbers and distribution of pinnipeds within the study area between "The Shack" and Seal Cove Point at San Clemente Island, by data collection period, during 1983.

Trip Period Date	Location[1]	CALIFORNIA SEA LION 1982 Pups	1983 Pups	1983 Non-pup	Total Number	NORTHERN ELEPHANT SEAL 1983 Pups	1983 Non-pup	HARBOR SEAL 1983 Pups	1983 Non-pup
2/24-28	SMP	233	0	183	416	0	0	-No Count-	
	MP[2]	146	0	86	232	0	0	0	0
	NMP	111	0	62	173	0	0	0	0
	Totals[2]	490	0	331	821	0	0	0	0
3/17-21	SMP	115	0	275	390	0	0	0	0
	MP	126	0	250	376	0	7	0	0
	NMP	70	0	79	149	0	0	1	0
	Totals	311	0	604	915	0	7	1	0
4/14/-18	SMP	113	0	253	366	0	4	-No Count-	
	MP	109	0	318	427	0	40	0	0
	NMP	49	0	137	186	0	0	0	0
	Totals	271	0	708	979	0	44	0	0
5/12-16	SMP	56	0	448	504	0	0	0	11
	MP	82	0	211	293	0	36	0	0
	NMP	20	1	110	131	0	0	0	0
	Totals	158	1	769	928	0	36	0	11
6/23-27	SMP	-	80	841	921	0	0	0	0
	MP	-	53	120	173	0	1	0	0
	NMP	-	75	248	323	0	0	0	0
	Totals	-	208	1209	1417	0	1	0	0
7/21-25	SMP	-	61	664	725	0	0	0	16
	MP	-	172	316	488	0	0	0	0
	NMP	-	120	294	414	0	0	0	0
	Totals	-	353	1274	1627	0	0	0	16

[1]SMP - "The Shack" to Mail Point (3.0 km of coastline).
MP - Mail Point area (0.5 km of coastline).
NMP - Mail Point to Seal Cove Point (4.0 km of coastline).
[2]Incomplete count for area or trip.

Table 1. continued.

Trip Period Date	Location[1]	CALIFORNIA SEA LION 1982 Pups	CALIFORNIA SEA LION 1983 Pups	CALIFORNIA SEA LION 1983 Non-pup	CALIFORNIA SEA LION Total Number	NORTHERN ELEPHANT SEAL 1983 Pups	NORTHERN ELEPHANT SEAL 1983 Non-pup	HARBOR SEAL 1983 Pups	HARBOR SEAL 1983 Non-pup
8/18-22	SMP	-	49	208	257	0	0	-No Count-	
	MP[2]	-	211	192	403	0	0	0	0
	NMP	-	118	226	344	0	0	0	0
	Totals[2]	-	378	626	1004	0	0	0	0
9/15-19	SMP	-	61	157	218	0	0	-No Count-	
	MP[2]	-	149	50	199	0	4	0	0
	NMP	-	106	108	214	0	1	0	0
	Totals[2]	-	316	315	631	0	5	0	0
11/3-7	SMP	-	104	239	343	0	0	0	14
	MP[2]	-	46	48	94	0	11	0	0
	NMP	-	41	44	85	0	0	0	0
	Totals[2]	-	191	331	522	0	11	0	14
12/15-19	SMP	-	117	242	359	0	1	0	18
	MP	-	33	27	60	0	17	0	0
	NMP	-	62	59	121	0	1	0	0
	Totals	-	212	328	540	0	19	0	18

Table 2. Sightings of hauled-out pinnipeds obtained during aerial surveys of San Clemente Island during 1983.

Flight[1] Number	Marine[2] Mammal Species Code	Estimated Number of Animals	Sighting Number	Date	Local Time (Decimal Minute)	Location[3]	Position (Decimal Minute)
1	93	30	1.1	83/04/25	10 580		32 494 N 118 280 W
1	93	10	2.1	83/04/25	10 590		32 497 N 118 254 W
1	91	NO ESTIMATE	3.1	83/04/25	11 040	SMP	32 528 N 118 306 W
1	91	NO ESTIMATE	3.2	83/04/25	11 045	SMP	32 530 N 118 308 W
1	91	NO ESTIMATE	4.1	83/04/25	11 050	SMP	32 530 N 118 309 W
1	91	NO ESTIMATE	4.2	83/04/25	11 055	MP	32 532 N 118 311 W
1	92	NO ESTIMATE	4.3	83/04/25	11 055	MP	32 532 N 118 311 W
1	91	NO ESTIMATE	5.1	83/04/25	11 060	NMP	32 538 N 118 315 W
1	91	150	6.1	83/04/25	11 140	NW HARBOR ISLET	33 022 N 118 354 W
2	93	25	1.1	83/06/03	9 323		32 484 N 118 278 W
2	93	6	2.1	83/06/03	9 360	THE SHACK	32 514 N 118 309 W
2	91	NO ESTIMATE	3.1	83/06/03	9 363	SMP	32 528 N 118 306 W
2	91	NO ESTIMATE	3.2	83/06/03	9 368	MP	32 532 N 118 311 W
2	91	20	4.1	83/06/03	9 372	NMP	32 525 N 118 318 W
2	91	NO ESTIMATE	5.1	83/06/03	9 375	NMP	32 530 N 118 320 W
2	91	NO ESTIMATE	6.1	83/06/03	9 378	NMP	32 534 N 118 326 W
2	91	200	7.1	83/06/03	9 455	NW HARBOR ISLET	33 013 N 118 360 W
3	91	1	1.1	83/07/11	10 170		32 500 N 118 211 W
3	93	2	2.1	83/07/11	10 250	THE SHACK	32 527 N 118 255 W
3	91	175	3.1	83/07/11	10 253	SMP	32 528 N 118 306 W
3	91	75	3.2	83/07/11	10 254	SMP	32 528 N 118 306 W
3	91	100	3.3	83/07/11	10 255	SMP	32 528 N 118 307 W
3	91	30	3.4	83/07/11	10 256	SMP	32 529 N 118 308 W
3	91	100	3.5	83/07/11	10 257	SMP	32 529 N 118 309 W
3	91	30	3.6	83/07/11	10 258	SMP	32 530 N 118 309 W
3	91	50	3.7	83/07/11	10 259	SMP	32 530 N 118 309 W
3	91	275	3.8	83/07/11	10 262	MP	32 531 N 118 311 W
3	91	10	4.1	83/07/11	10 264	NMP	32 534 N 118 312 W
3	91	35	4.2	83/07/11	10 266	NMP	32 537 N 118 314 W
3	91	12	4.3	83/07/11	10 268	NMP	32 537 N 118 314 W
3	91	NO ESTIMATE	4.4	83/07/11	10 270	NMP	32 538 N 118 315 W
3	91	NO ESTIMATE	4.5	83/07/11	10 272	NMP	32 541 N 118 317 W
3	91	1	4.6	83/07/11	10 306	NMP	32 544 N 118 322 W
3	91	25	5.1	83/07/11	10 368	NW HARBOR ISLET	33 027 N 118 328 W

[1]Surveyed area: flights 1-4 surveyed the entire island.
[2]Species codes: 91-California sea lion; 92-Northern elephant seal; 93-Harbor seal
[3]Location: Within the study area; NMP-North of Mail Point; MP-Mail Point; SMP-South of Mail Point

Table 2. continued

Flight[1] Number	Marine[2] Mammal Species Code	Estimated Number of Animals	Sighting Number	Date	Local Time (Decimal Minute)	Location[3]	Position (Decimal Minute)
4	93	2	1.1	83/10/03	10 443	THE SHACK	32 520 N 118 305 W
4	91	50	2.1	83/10/03	10 450	SMP	32 528 N 118 306 W
4	91	130	2.2	83/10/03	10 453	SMP	32 527 N 118 307 W
4	91	10	2.3	83/10/03	10 455	SMP	32 530 N 118 309 W
4	91	6	2.4	83/10/03	10 455	SMP	32 530 N 118 309 W
4	91	23	2.5	83/10/03	10 460	MP	32 531 N 118 311 W
4	91	3	3.1	83/10/03	10 475	NMP	32 530 N 118 314 W
4	91	21	4.1	83/10/03	10 477	NMP	32 537 N 118 314 W
4	91	6	5.1	83/10/03	10 478	NMP	32 537 N 118 314 W
4	91	3	6.1	83/10/03	10 484	NMP	32 543 N 118 322 W
4	91	13	7.1	83/10/03	10 547	NW HARBOR ISLET	33 023 N 118 351 W
4	91	4	8.1	83/10/03	10 565	CASTLE ROCK	33 020 N 118 360 W

Table 3. Observed age class distributions for northern elephant seals within the study area at San Clemente Island during 1983.

Trip Period Date	Subadult/Adult M	F	Unsexed	Yearling/ Juvenile
February 24-28	0	0	0	0
March 17-21	0	4	0	3
April 14-18	0	0	0	44
May 12-16	0	0	0	36
June 23-27	0	0	0	1
July 21-25	0	0	0	0
August 18-22	0	0	0	0
September 15-19	0	0	0	5
November 3-7	0	0	0	11
December 15-19	0	0	0	19

Table 4. Numbers of California Sea lion scats and spewings collected within the study area at San Clemente Island during 1983.

Trip Period Date	Area of Collection[1]	NUMBER OF SCATS AND SPEWINGS COLLECTED Fresh scats	Dry scats	Spewings	Totals
2/24-28	SMP	3	40	5	48
3/17-21	MP, SMP	10	15	0	25
4/14-18	SMP, MP, NMP	9	58	1	68
5/12-16	SMP, MP, NMP	17	62	1	80
6/23-27	SMP	2	18	0	20
7/21-25	MP, SMP	4	63	0	67
11/3-7	MP, SMP	25	71	0	96
12/15-19	MP, SMP	35	8	1	44
TOTALS		105	335	8	448

[1]SMP - "Arch Rock" to Mail Point (1.4 km of coastline)
MP - Mail Point Area (0.5 km of coastline)
NMP - Mail Point to Seal Cove Point (4.0 km of coastline)

Table 5a. Positively identified prey found in 396 California sea lion scats and 7 spewings collected within the study area at San Clemente Island during 1983. Data are presented for the number and percent frequency of occurrence (PFO) from all samples in which a prey item was recovered.

PREY SPECIES		Numbers of Occurrences for Total Sample	PFO for Total Sample
Scientific Name	Common Name	N	%
Engraulis mordax	Northern anchovy	175	43.4
Pleuroncodes planipes	Pelagic red crab	170	42.2
Sebastes spp.	Rockfish	91	22.6
Trachurus symmetricus	Jack mackerel	86	21.3
Loligo opalescens	Market squid	67	16.6
Chromis punctipinnis	Blacksmith	58	14.4
Scomber japonicus	Pacific mackerel	39	9.7
[1]Unidentified fish spp.		39	9.7
Merluccius productus	Pacific whiting	29	7.2
Unidentified flatfish spp.		16	4.0
Octopus spp.	Octopus	11	2.7
Oxyjulis californica	Senorita	8	2.0
[1]Unidentified cephaopod spp.	Squid and octopus	7	1.7
Onychoteuthis borealijaponicus	Squid	7	1.7
Porichthys notatus	Plainfin midshipman	7	1.7
Sebastolobus sp.	Thornyhead rockfish	6	1.5
MYCTOPHIDAE	Lanternfish	6	1.5
COTTIDAE	Sculpin	3	0.7
Abraliopsis felis	Squid	2	0.5
Icichthys lockingtoni	Medusafish	2	0.5
Gonatus sp.	Squid	2	0.5
Cypselurus californicus	California flying fish	2	0.5
ZOARCIDAE	Eelpouts	2	0.5
Lyopsetta exilis	Slender sole	1	0.2
LABRIDAE	Wrasses	1	0.2
Galeorhinus galeus	Soupfin shark	1	0.2
Prionace glauca	Blue shark	1	0.2
SCOMBRIDAE	Mackerels and tunas	1	0.2
EMBIOTOCIDAE	Surfperches	1	0.2
Unidentified shark tooth		1	0.2
Unidentified fish tooth		1	0.2
Cartilaginous fish vertebrate		1	0.2
TOTAL NUMBER OF OCCURRENCES		844	

[1]Unidentified species are not included in Table 5b.

Table 5b. Probable prey identifications found in 396 California sea lion scats and 7 spewings collected within the study area at San Clemente Island during 1983. Data are presented for the number and percent frequency of occurrence (PFO) from all samples in which a prey item was recovered.

PREY SPECIES		Numbers of Occurrences for Total Sample	PFO for Total Sample
Scientific Name	Common Name	N	%
Engraulis mordax	Northern anchovy	7	1.7
Trachurus symmetricus	Jack mackerel	4	1.0
Chromis punctipinnis	Blacksmith	2	0.5
Sebastes spp.	Rockfish	2	0.5
Girella nigricans	Opaleye	1	0.3
Unidentified flatfish		1	0.3
EMBIOTOCIDAE	Surfperch		
TOTAL NUMBER OF OCCURRENCES		22	

Table 6. Summary of dead pinniped strandings observed at San Clemente Island during 1983. Unless noted, all strandings were California sea lions.

	SEAL COVE POINT TO THE SHACK			THE SHACK TO LOST POINT			TOTALS		
Trip Period Dates	1982 Pups	1983 Pups	Non-Pups	1982 Pups	1983 Pups	Non-Pups	1982 Pups	1983 Pups	Non-Pups
2/24-28[1]	0	0	1	NOT SURVEYED			0	0	1
3/17-21[2]	1	1[3]	3	NOT SURVEYED			1	1[3]	3
4/14-18	7	4[3]	5	NOT SURVEYED			7	4[3]	5
5/12-16[4]	0	9	0	4	1	10	4	10	10
6/23-27	0	0	0	0	1	1	0	1	1
7/7[5]	1[5]			NOT SURVEYED			1[5]		
7/21-25	0	0	0	0	0	1	0	0	1
8/18-22[1]	0	0	0	NOT SURVEYED			0	0	0
9/15-19[1]	0	6	0	NOT SURVEYED			0	6	0
11/3-7[1]	0	7[6]	2	NOT SURVEYED			0	7[6]	2
12/15-19	0	13[7]	2	NOT SURVEYED			0	13[7]	2
TOTALS	9	40	13	4	2	12	13	42	25

[1] Incomplete count for area or trip
[2] In addition to dead California sea lion strandings, one dead northern elephant seal was also observed.
[3] These specimens were catorgized as premature births.
[4] In addition to dead California sea lion strandings, one dead harbor seal was also observed.
[5] San Clemente Island tags observed on one dead California sea lion pup (tags 198). Reported by a commercial fisherman who found the dead female in a monofilament gillnet off Mail Point on July 7, 1983.
[6] San Clemente Island tags observed on two dead California sea lion pups (tags 223, 266).
[7] San Clemente Island tags observed on six dead California sea lion pups (tags 228, 257, 264, 282, 308, 323).

Table 7. Numbers of California sea lion pups captured, tagged, and weighed at San Clemente Island during 1983.

Sex	Number of Tagged 1983 Pups	Mean Weight of 1983 Pups	SD
Males	70 (55%)	16.1 kg (N=66)	4.3
Females	75 (45%)	13.6 kg (N=66)	4.0
Both	145		

Table 8. Unique resights of San Clemente Island-tagged California sea lions within the study area at San Clemente Island, by month, during 1983.

	CALIFORNIA SEA LIONS					
	1981 Pups		1982 Pups		1983 Pups	
Month	Tags Read	Tags Unread	Tags Read	Tags Unread	Tags Read	Tags Unread
February	0	0	33	10	-	-
March	0	0	6	12	-	-
April	0	0	20	9	-	-
May	0	0	2	2	-	-
June	0	0	0	2	-	-
July	0	0	(1)[1]	1	-	-
August	NOT SURVEYED FOR TAG RESIGHTS					
September	0	0	0	0	-	-
November	0	0	1	0	34(2)[2]	5
December	0	0	0	0	40(6)[3]	0

[1] San Clemente Island tags observed on one dead California sea lion pup (tags 198). This animal was reported by a commercial fisherman who found it in a monofilament gillnet (halibut set net) in 14 fathoms of water off Mail Point on July 7, 1983.

[2] San Clemente Island tags observed on two dead California sea lion pups (tags 223, 266).

[3] San Clemente Island tags observed on six dead California sea lion pups (tags 228, 257, 264, 282, 308, 323).

Table 9. Resights of live tagged pinnipeds, from other areas, observed within the study area at San Clemente Island during 1983.

Tag Resight Date	Tag Number, Color, Type and Placement	Observed Age	Species	Area Where Animal Was Tagged
April 16, 1983	3484 Red Riese Both rear flippers	Yearling	Mirounga angustirostris	San Nicolas Island
April 16, 1983	3413 Red Riese Left rear flipper 3414 Red Riese Right rear flipper	Yearling	Mirounga angustirostris	San Nicolas Island
April 16, 1983	3553 Red Riese Right rear flipper 3553 Red Roto Left rear flipper	Yearling	Mirounga angustirostris	San Nicolas Island
April 16, 1983	9595 Yellow Riese Right rear flipper 9595 Yellow Roto Left rear flipper	Yearling	Mirounga angustirostris	San Miguel Island
April 16, 1983	3426 Yellow Riese Right rear flipper 3425 Yellow Riese Left rear flipper	Yearling	Mirounga angustirostris	San Miguel Island
April 17, 1983	3610 Red Riese Right rear flipper 3610 Red Roto Left rear flipper	Yearling	Mirounga angustirostris	San Nicolas Island
May 14, 1983	Red Riese[1] Left rear flipper	Unknown	Mirounga angustirostris	San Nicolas Island
May 14, 1983	Red Riese[1] Left rear flipper	Unknown	Mirounga angustirostris	San Nicolas Island
December 17, 1983	301 Blue Riese Both fore flippers	Pup	Zalophus californianus	Santa Barbara Island
December 18, 1983	4641 Red Riese Both rear flippers	Juvenile	Mirounga angustirostris	San Nicolas Island

[1]Tag numbers were either illegible or not visible.

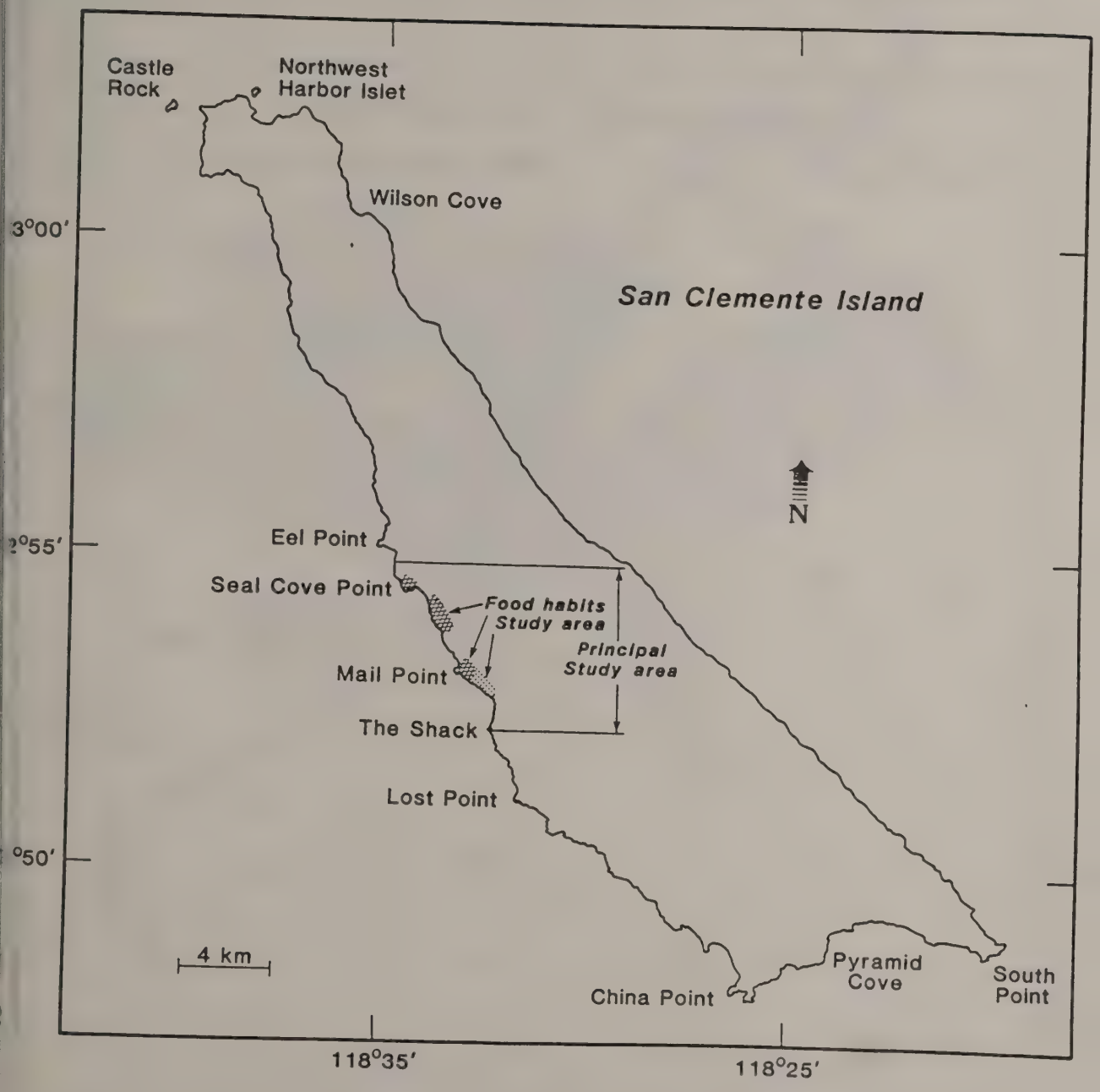


Figure 1. Map of San Clemente Island showing the study area. Observed breeding areas are indicated by crosshatch. Areas used primarily as haulouts are indicated with stipple.

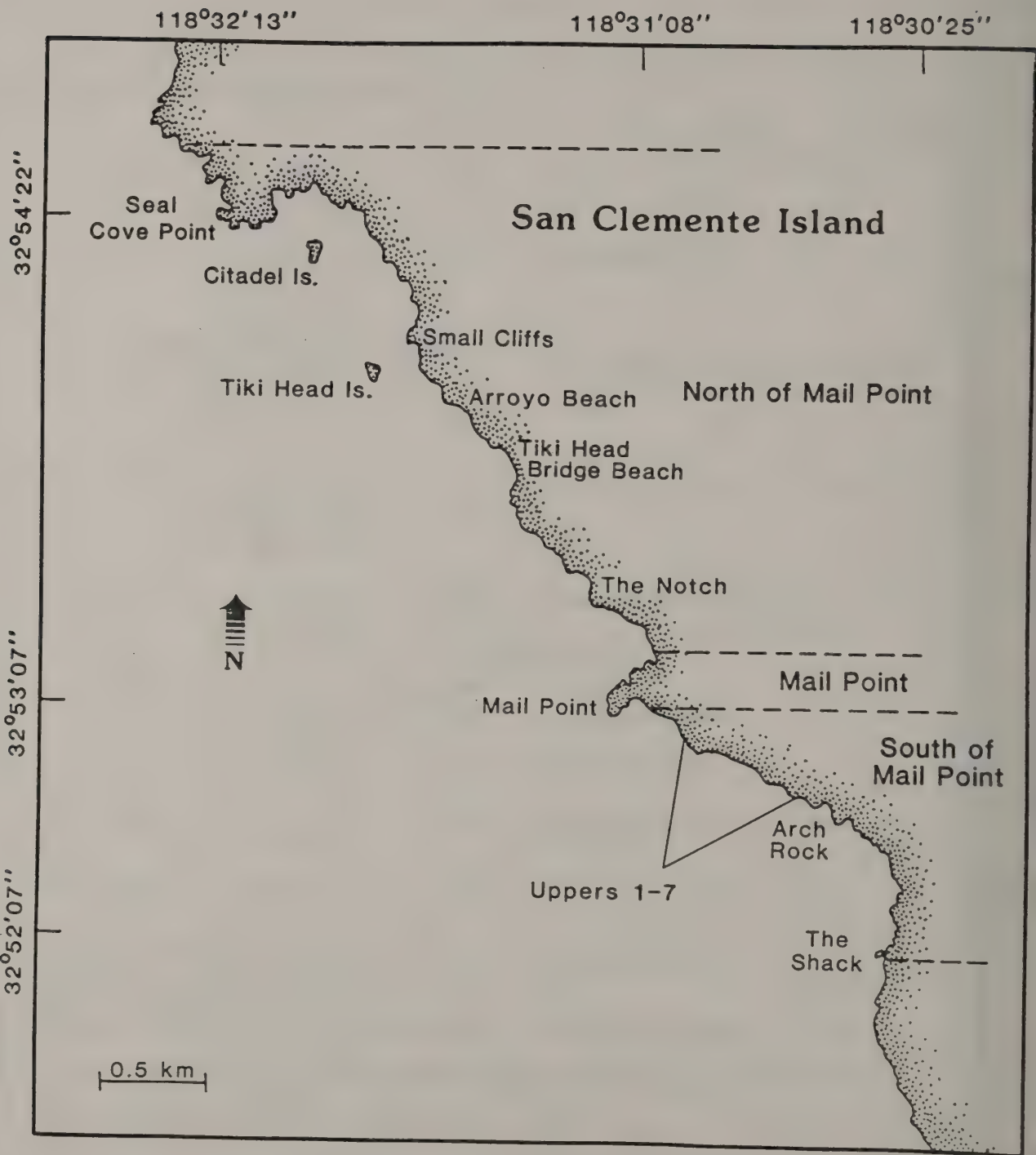


Figure 2. San Clemente Island pinniped study area indicating the locations of the three sub-areas.

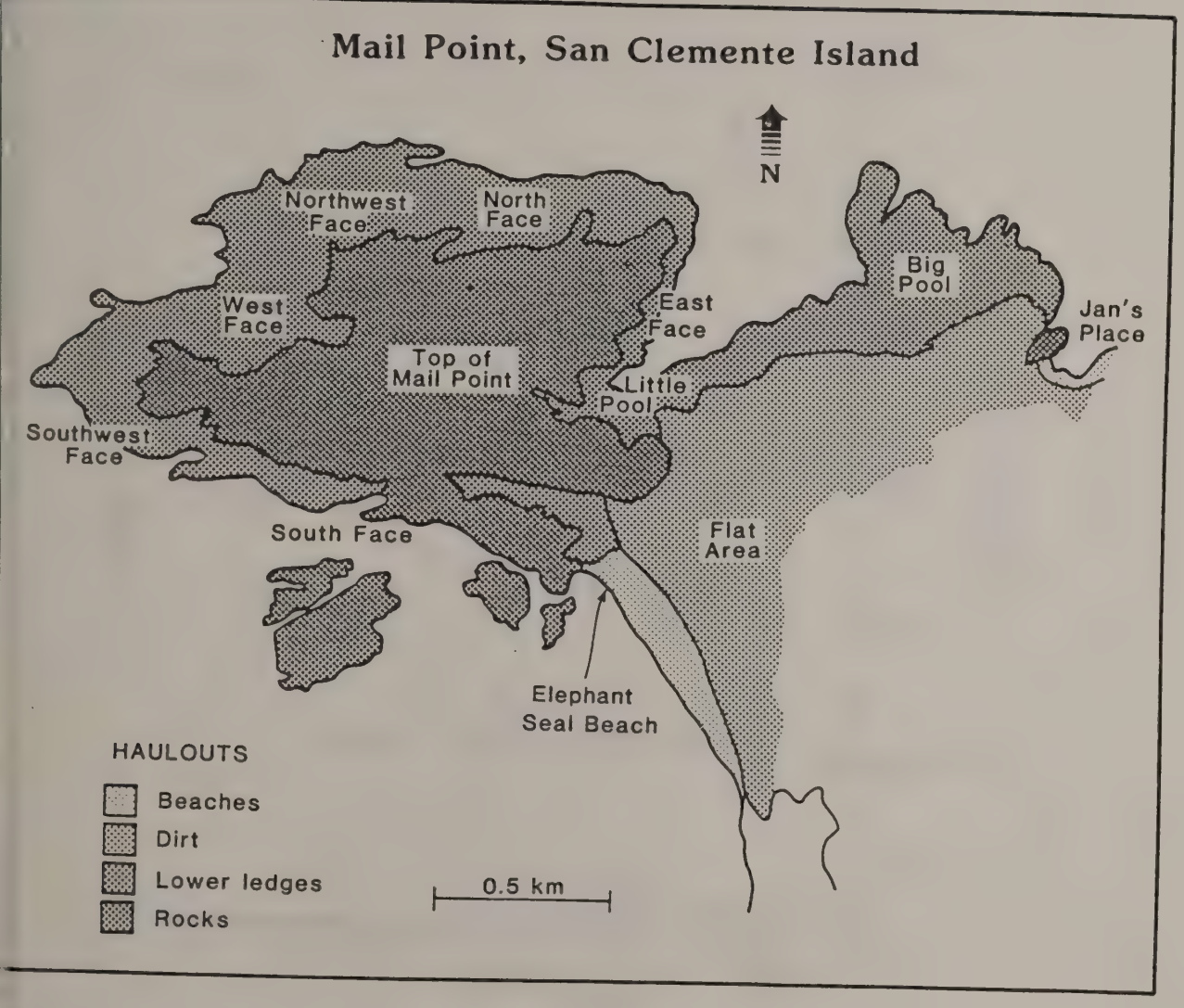


Figure 3. Haulout and breeding areas for California sea lions (Zalophus californianus) and northern elephant seals (Mirounga angustirostris) at Mail Point.

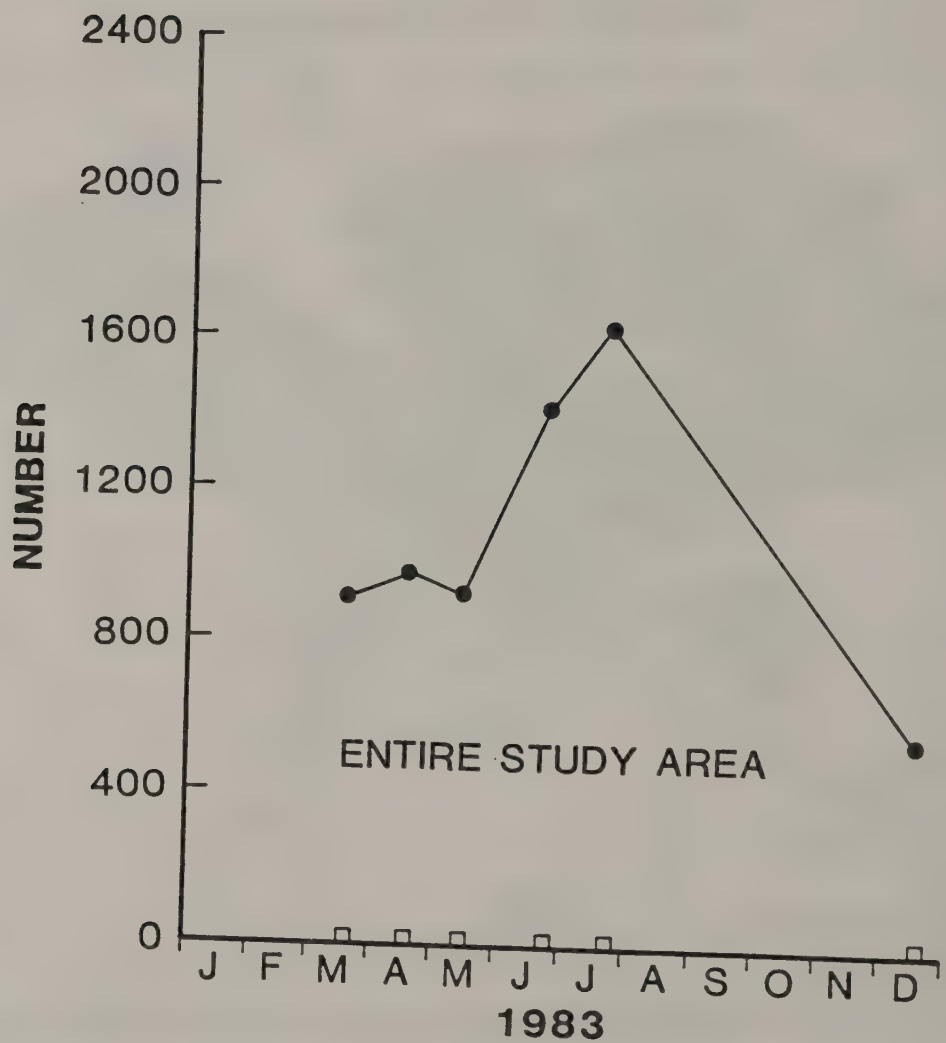


Figure 4. Total numbers of California sea lions observed in the entire study area at San Clemente Island for trips during which a complete count was obtained.

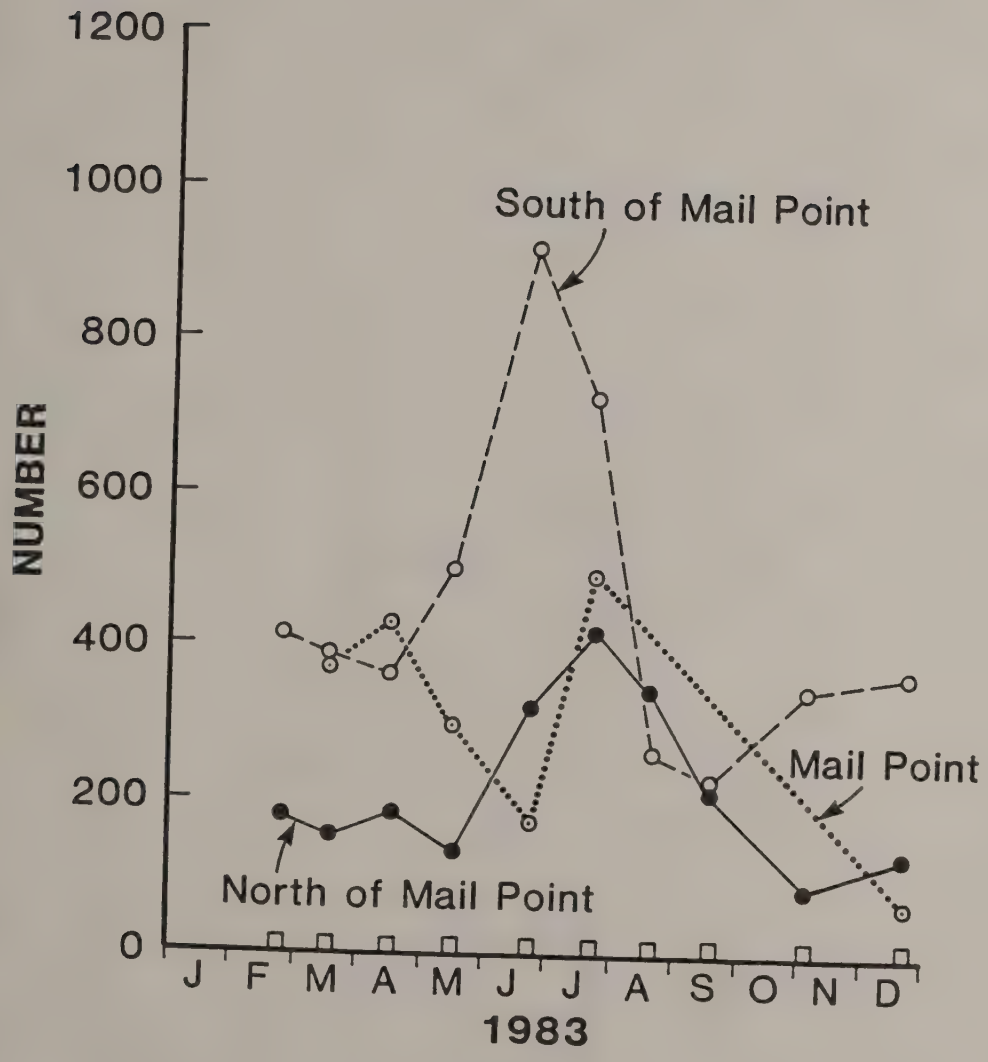


Figure 5. Total numbers of California sea lions observed in each of the sub-areas at San Clemente Island for trips during which a complete sub-area count was obtained

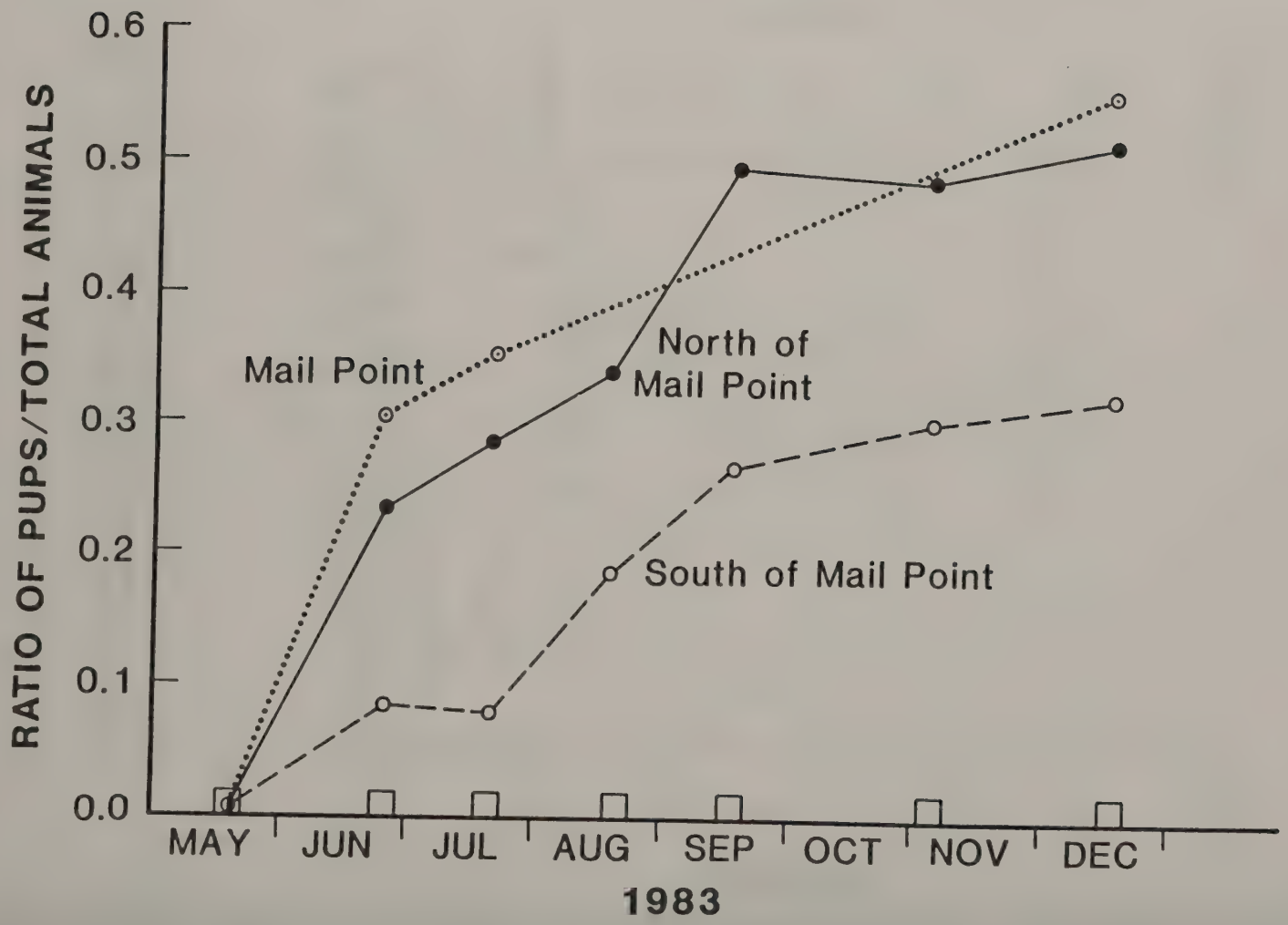
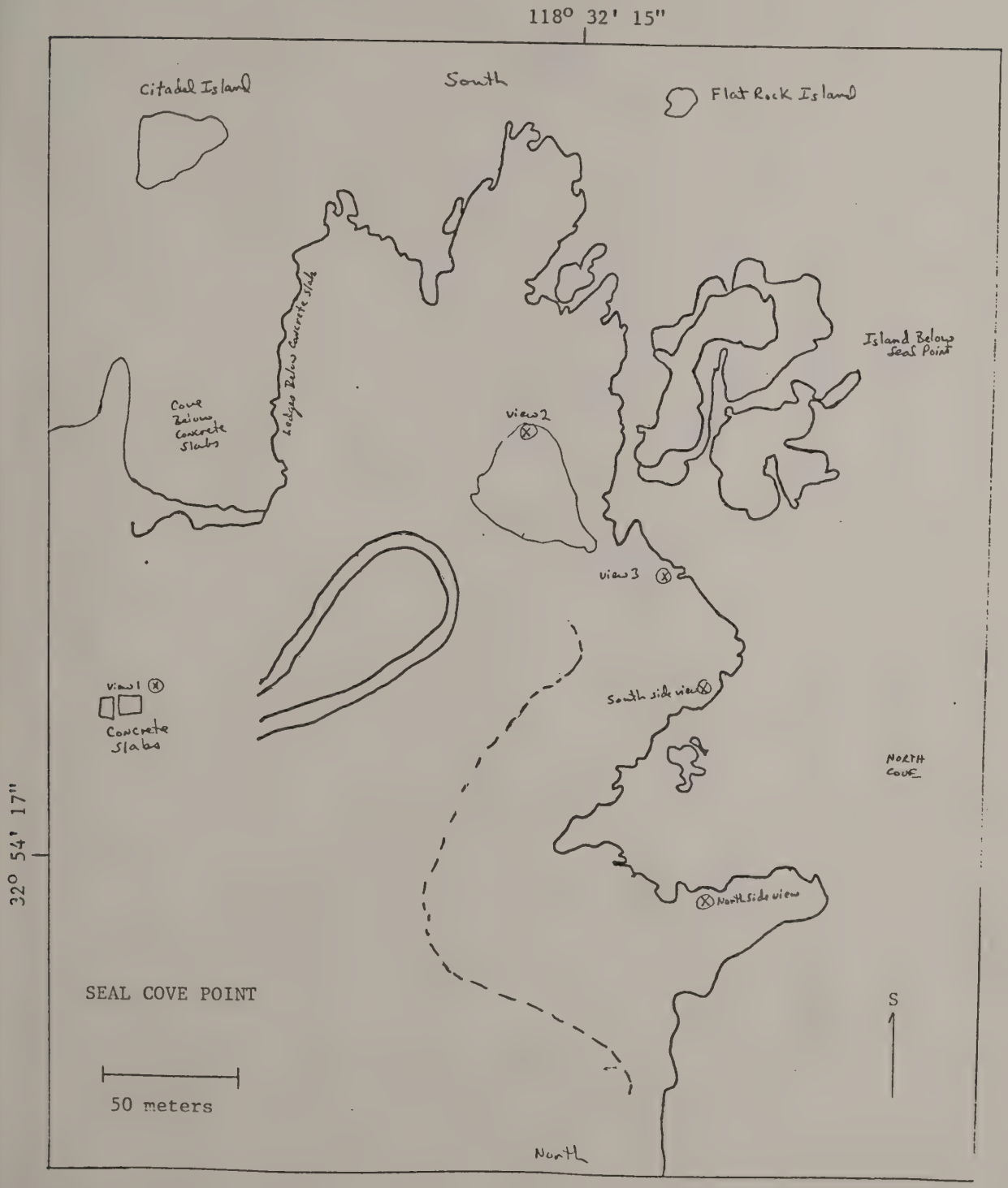


Figure 6. Ratios of 1983-cohort California sea lion pups to the total number of sea lions in the study area at San

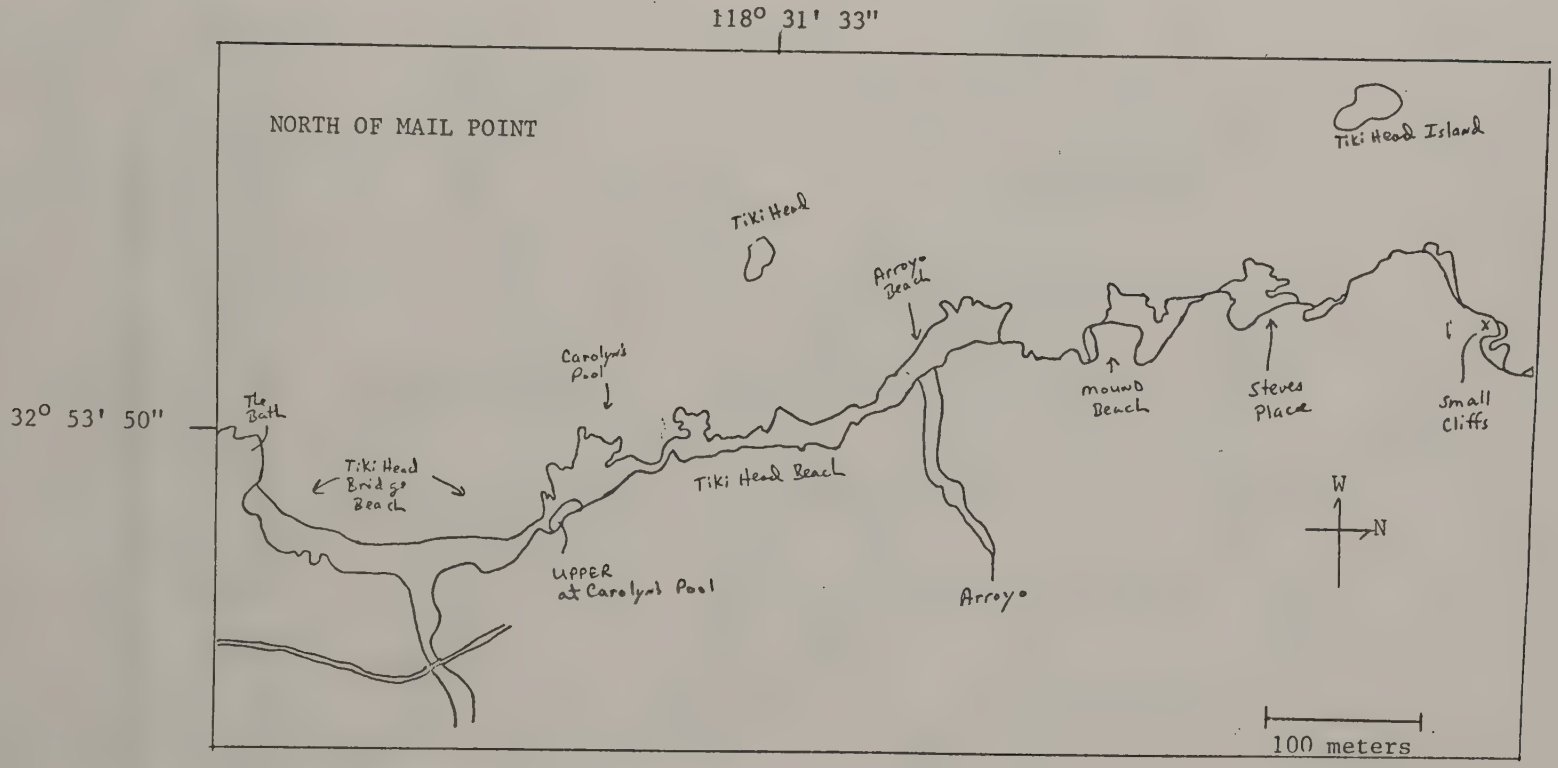
Appendix I. San Clemente Island census area field form (1 of 7).



Date:
Observer:
Beaufort:
Surf:

Start Time:
End Time:

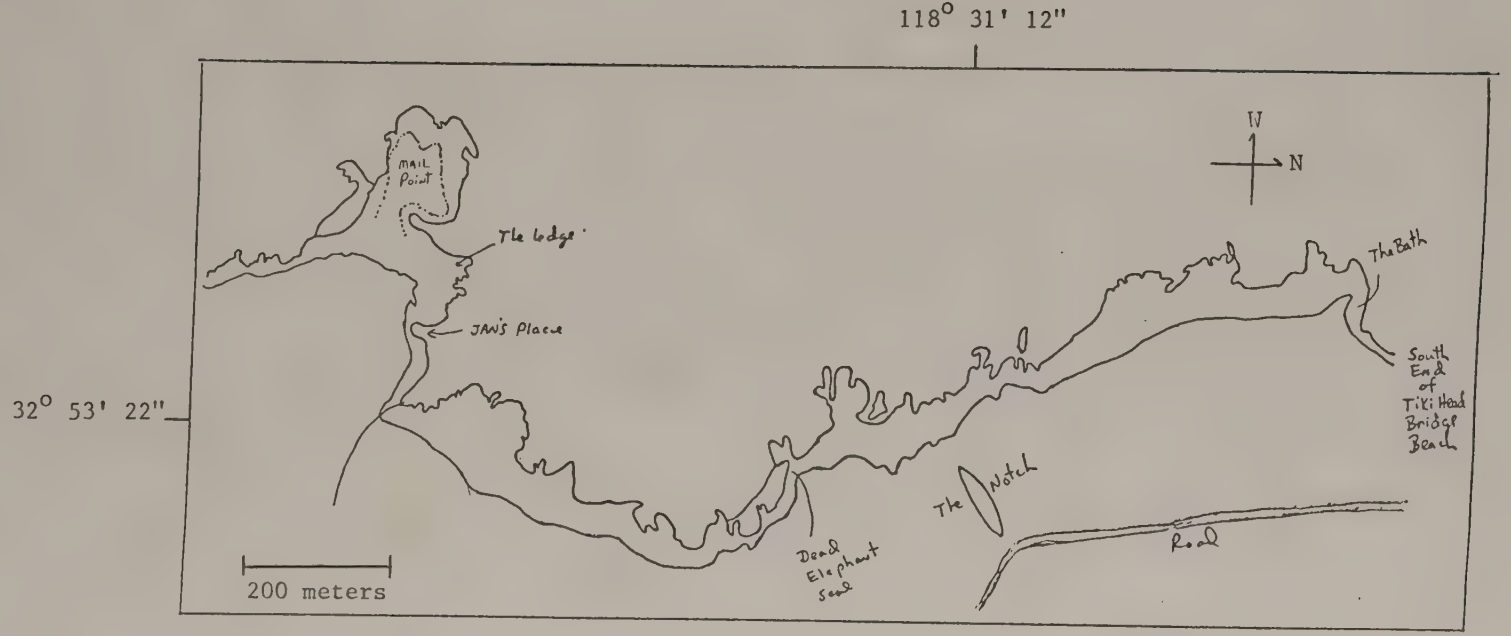
Appendix I. San Clemente Island census area field form (2 of 7).



Date:
Observer:
Beaufort:
Surf:

Start Time:
End Time:

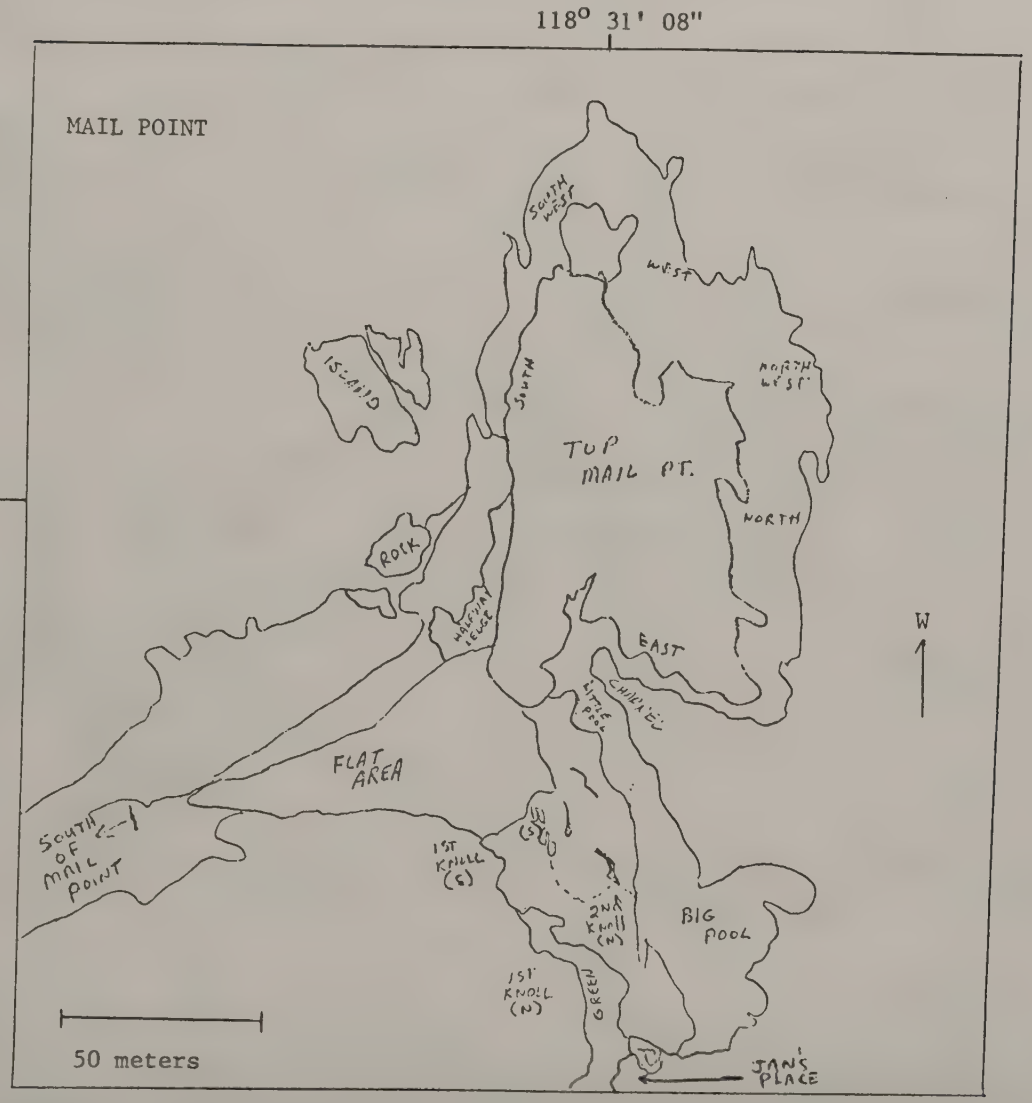
Appendix I. San Clemente Island census area field form (3 of 7).



Date:
Observer:
Beaufort:
Surf:

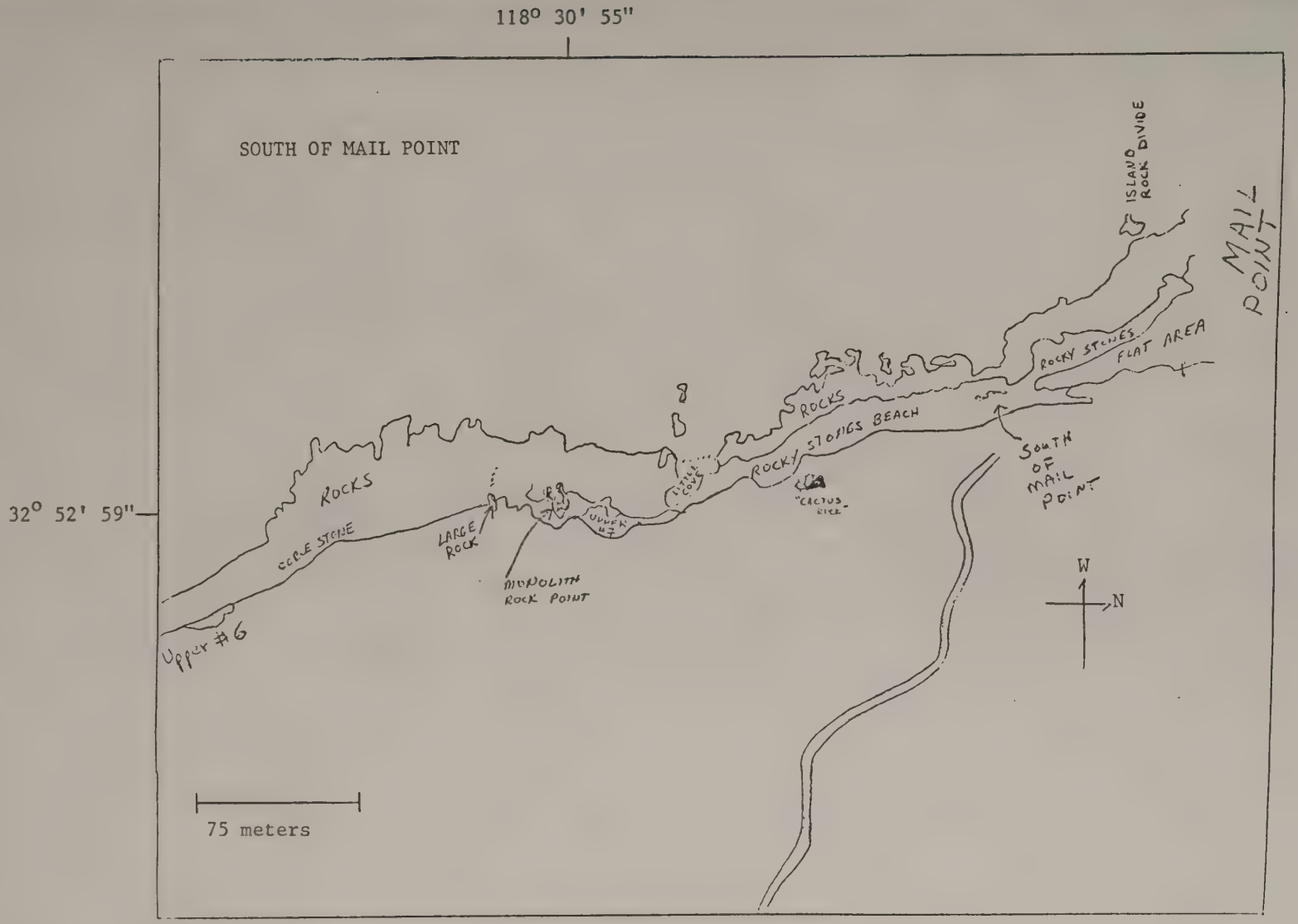
Start Time:
End Time:

Appendix I. San Clemente Island census area field form (4 of 7).



Date:
Observer:
Beaufort:
Surf:

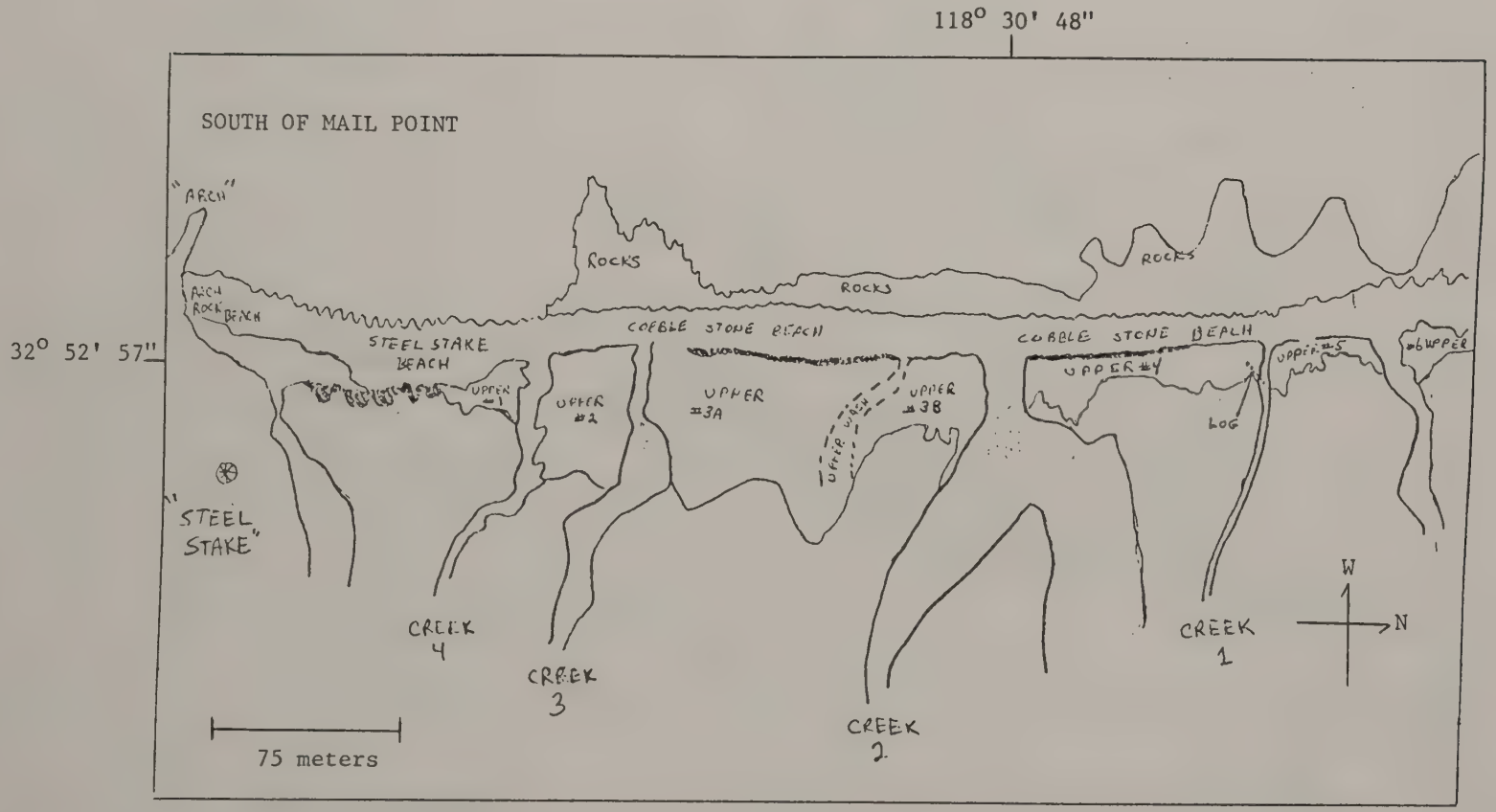
Start Time:
End Time:



Date:
Observer:
Beaufort:
Surf:

Start Time:
End Time:

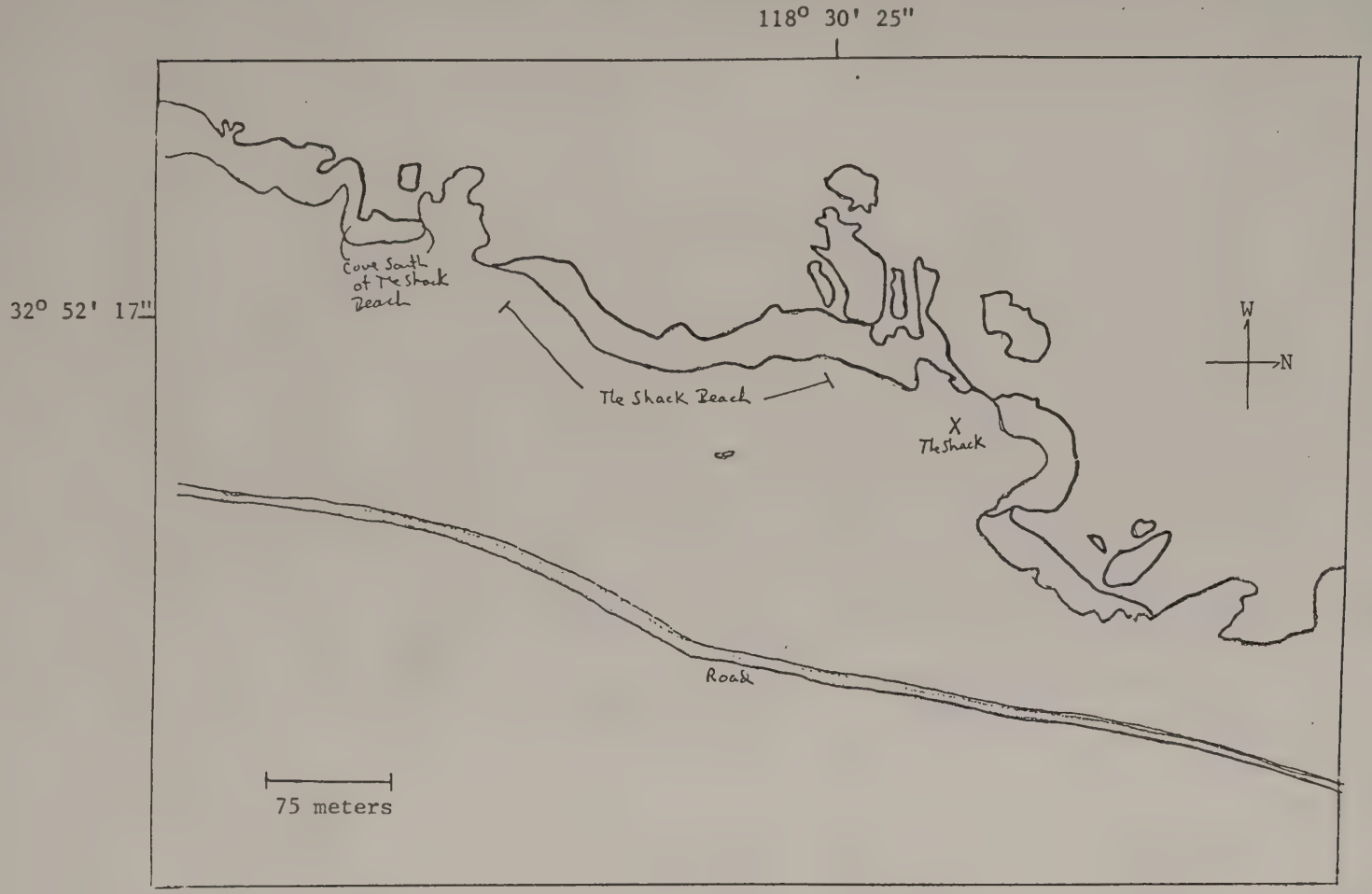
Appendix I. San Clemente Island census area field form (6 of 7).



Date:
Observer:
Beaufort:
Surf:

Start Time:
End Time:

Appendix I. San Clemente Island census area field form (7 of 7).



Date:
Observer:
Beaufort:
Surf:

Start Time:
End Time:

Appendix II. Dead strandings of marine mammals salvaged on San Clemente Island during 1983.

DATE	SPECIMEN NUMBER	SPECIES[1]	LATITUDE	LONGITUDE	SEX[2]	AGE CLASS[3]	TAGS PRESENT	SPECIMEN PART COLLECTED	
								TEETH ?	SKULL ?
830226		Z	32 52'59''N	118 30'55''W	U	A			
830319		Z	32 53'50''N	118 31'33''W	F	A			
830319	CWO0870	Z	32 53'43''N	118 31'25''W	M	SA			
830319	CWO0871	M	32 53'22''N	118 31'12''W	M	A		YES	YES
830319	CWO0872	Z	32 53'22''N	118 31'12''W	M	J			
830320	CWO0873	Z	32 53'07''N	118 31'04''W	U	PRE		YES	YES
830320	CWO0874	Z	32 53'07''N	118 31'04''W	U	P82			
830415		Z	32 53'50''N	118 31'33''W	U	J/SA			
830415		Z	32 53'50''N	118 31'33''W	U	J/SA			
830415		Z	32 53'50''N	118 31'33''W	U	J/SA			
830415		Z	32 53'50''N	118 31'33''W	U	J/SA			
830416	CWO0875	Z	32 53'07''N	118 31'08''W	F	PRE		YES	YES
830416	CWO0876	Z	32 53'07''N	118 31'04''W	U	PRE			
830416	CWO0877	Z	32 53'07''N	118 31'04''W	M	P82		YES	
830416	CWO0878	Z	32 53'07''N	118 31'04''W	F	A		YES	YES
830416	CWO0879	Z	32 53'07''N	118 31'04''W	U	PRE			
830416	CWO0880	Z	32 53'07''N	118 31'04''W	U	P82		YES	
830416	CWO0881	Z	32 53'07''N	118 31'04''W	U	P82		YES	
830416		Z	32 53'10''N	118 31'07''W	U	PRE			
830417	CWO0882	Z	32 53'10''N	118 31'07''W	U	P82			
830417	CWO0883	Z	32 53'10''N	118 31'07''W	F	P82		YES	
830417	CWO0884	Z	32 53'10''N	118 31'07''W	U	P82			
830417	CWO0885	Z	32 52'58''N	118 30'52''W	U	P82		YES	YES
830513	CWO0886	Z	32 53'55''N	118 31'33''W	M	P83			
830514		Z	32 53'07''N	118 31'04''W	U	P83			
830514		Z	32 53'07''N	118 31'04''W	U	P83			
830514		Z	32 53'00''N	118 30'57''W	U	P83			
830514	LMF0001	Z	32 52'57''N	118 30'48''W	F	P83			
830514		Z	32 52'51''N	118 30'37''W	U	P83			
830514		Z	32 52'51''N	118 30'37''W	U	P83			
830514		Z	32 52'51''N	118 30'37''W	U	P83			
830514		Z	32 52'51''N	118 30'36''W	U	P83			
830515		Z	32 52'17''N	118 30'25''W	U	J/SA			
830515		P	32 52'17''N	118 30'25''W	U	J/A			

[1] SPECIES: M=Northern elephant seal (Mirounga angustirostris)
Z=California sea lion (Zalophus californianus)
P=Harbor seal (Phoca vitulina richardsi)

[2] SEX: M=Male; F=Female; U=Unknown

[3] AGE CLASS: P82=Pup of 1982; P83=Pup of 1983; Y=Yearling; J=Juvenile; SA=Subadult; A=Adult; U=Unknown; PRE=Premature

Appendix II. continued

DATE	SPECIMEN NUMBER	SPECIES[1]	LATITUDE	LONGITUDE	SEX[2]	AGE CLASS[3]	TAGS PRESENT	SPECIMEN PARTS COLLECTED: TEETH ?	SKULL ?
830515	CWO0887	Z	32 51'08''N	118 29'58''W	U	SA			
830515	CWO0888	Z	32 51'08''N	118 29'55''W	F	P82		YES	
830515		Z	32 51'08''N	118 29'55''W	U	P82			
830515	CWO0889	Z	32 51'06''N	118 29'55''W	M	SA			
830515		Z	32 51'06''N	118 29'55''W	U	J/A			
830515		Z	32 51'30''N	118 30'00''W	U	SA/A			
830515	CWO0890	Z	32 51'45''N	118 30'10''W	U	A			
830515		Z	32 51'45''N	118 30'10''W	U	A			
830515		Z	32 51'45''N	118 30'10''W	U	A			
830515	CWO0891	Z	32 51'45''N	118 30'10''W	U	A			
830515		Z	32 51'45''N	118 30'10''W	U	P82			
830515	CWO0892	Z	32 51'56''N	118 30'16''W	U	A		YES	
830515		Z	32 51'56''N	118 30'16''W	U	P82			
830515	CWO0893	Z	32 51'56''N	118 30'16''W	F	P83			
830626	LMF0002	Z	32 51'53''N	118 30'16''W	F	P83			
830626	LMF0003	Z	32 51'53''N	118 30'16''W	U	A			
830707		Z	32 53'07''N	118 31'08''W	F	P82	YES(198)		
830724	LMF0004	Z	32 51'53''N	118 30'16''W	U	A			
830917		Z	32 53'10''N	118 31'07''W	U	P83			
830917		Z	32 53'10''N	118 31'07''W	U	P83			
830917		Z	32 53'10''N	118 31'07''W	U	P83			
830917		Z	32 53'10''N	118 31'07''W	U	P83			
830917		Z	32 53'10''N	118 31'07''W	U	P83			
830917		Z	32 53'10''N	118 31'07''W	U	P83			
831104	JBW0001	Z	32 53'31''N	118 31'21''W	F	A			
831104	JBW0002	Z	32 53'10''N	118 31'02''W	U	A			
831105	CWO0894	Z	32 53'07''N	118 31'04''W	F	P83	YES(266)	YES	YES
831105	JBW0003	Z	32 53'10''N	118 31'06''W	U	P83			
831105	JBW0004	Z	32 53'07''N	118 31'04''W	M	P83	YES(223)		
831105		Z	32 53'07''N	118 31'04''W	U	P83			
831105		Z	32 53'07''N	118 31'04''W	U	P83			
831105		Z	32 53'07''N	118 31'04''W	U	P83			
831105		Z	32 53'00''N	118 30'57''W	U	P83			
831216		Z	32 53'07''N	118 31'08''W	M	P83	YES(282)		
831216		Z	32 53'00''N	118 30'57''W	U	P83			
831216	JBW0005	Z	32 52'59''N	118 30'55''W	U	A			
831216	JBW0006	Z	32 52'59''N	118 30'55''W	M	P83			
831218	JBW0007	Z	32 53'07''N	118 31'08''W	U	P83			
831218	JBW0008	Z	32 53'07''N	118 31'08''W	U	P83			
831218		Z	32 53'07''N	118 31'08''W	F	P83	YES(257)		
831218	JBW0009	Z	32 53'07''N	118 31'04''W	M	P83	YES(264)	YES	YES
831218		Z	32 53'07''N	118 31'04''W	M	P83	YES(228)		
831218	JBW0010	Z	32 53'07''N	118 31'04''W	U	Y			
831218	JBW0011	Z	32 53'07''N	118 31'04''W	U	P83			
831218	JBW0012	Z	32 53'07''N	118 31'04''W	U	P83			

Appendix II. continued

DATE	SPECIMEN NUMBER	SPECIES[1]	LATITUDE	LONGITUDE	SEX[2]	AGE CLASS[3]	TAGS PRESENT	SPECIMEN PART COLLECTED	
								TEETH ?	SKULL ?
831218	JBW0013	Z	32 53'07''N	118 31'04''W	F	P83	YES(323)		
831218	JBW0014	Z	32 53'07''N	118 31'04''W	U	P83			
831218		Z	32 53'07''N	118 31'04''W	M	P83	YES(308)		

Appendix III. White tags placed on California sea lions, Zalophus californianus, at San Clemente Island during 1983. All tags were Dalton Riese.

ANIMAL ID	DATE (YR/MO/DAY)	LOCAL TIME	LEFT FLIPPER TAG NUMBER	RIGHT FLIPPER TAG NUMBER	SEX	AGE CLASS P=PUP Y=YEARLING J=JUVENILE S=SUBADULT A=ADULT	ANIMAL CONDITION G=GOOD F=FAIR P=POOR	ANIMAL WEIGHT (KG)
217	83/09/17	1019	217	217	F	P	F	9.1
218	83/09/17	1019	218	218	F	P	G	11.3
219	83/09/17	1019	219	219	F	P	P	8.6
220	83/09/17	1019	220	220	M	P	G	16.8
221	83/09/17	1038	221	221	F	P	G	11.3
222	83/09/17	1046	222	222	F	P	G	10.4
223	83/09/17	1046	223	223	M	P	F	9.5
224	83/09/17	1046	224	224	F	P	F	10.0
225	83/09/17	1046	225	225	M	P	G	11.8
226	83/09/17	1046	226	226	M	P	F	9.1
227	83/09/17	1046	227	227	F	P	P	8.6
228	83/09/17	1046	228	228	M	P	F	9.1
229	83/09/17	1100	229	229	F	P	P	8.2
230	83/09/17	1115	230	230	F	P	F	9.1
231	83/09/17	1115	231	231	F	P	G	21.3
232	83/09/17	1115	232	232	M	P	G	12.2
233	83/09/17	1115	233	233	F	P	G	15.9
234	83/09/17	1115	234	234	M	P	P	7.2
235	83/09/17	1115	235	235	M	P	F	10.0
236	83/09/17	1115	236	236	M	P	G	16.8
237	83/09/17	1115	237	237	F	P	G	15.4
238	83/09/17	1135	238	238	M	P	G	14.0
239	83/09/17	1312	239	239	F	P	G	15.9
240	83/09/17	1312	240	240	F	P	P	8.6
241	83/09/17	1312	241	241	M	P	G	20.4
242	83/09/17	1312	242	242	F	P	P	7.7
243	83/09/17	1312	243	243	F	P	P	10.4
244	83/09/17	1312	244	244	F	P	G	11.8
245	83/09/17	1312	245	245	M	P	G	17.7
246	83/09/17	1312	246	246	M	P	G	16.3
247	83/09/17	1312	247	247	M	P	G	19.5
248	83/09/17	1312	248	248	M	P	G	12.7
249	83/09/17	1312	249	249	M	P	G	17.7
250	83/09/17	1312	250	250	F	P	G	15.4
251	83/09/17	1312	251	251	F	P	F	9.1
252	83/09/17	1312	252	252	M	P	G	16.8
253	83/09/17	1348	253	253	M	P	G	17.2
254	83/09/17	1348	254	254	M	P	G	19.5
255	83/09/17	1348	255	255	M	P	G	19.5
256	83/09/17	1348	256	256	F	P	G	16.8
257	83/09/17	1348	257	257	F	P	G	14.0
258	83/09/17	1348	258	258	F	P	G	16.8

Appendix III. continued

ANIMAL ID	DATE (YR/MO/DAY)	LOCAL TIME	LEFT FLIPPER TAG NUMBER	RIGHT FLIPPER TAG NUMBER	SEX	AGE CLASS P=PUP Y=YEARLING J=JUVENILE S=SUBADULT A=ADULT	ANIMAL CONDITION G=GOOD F=FAIR P=POOR	ANIMAL WEIGHT (KG)
259	83/09/17	1348	259	259	M	P	G	15.4
260	83/09/17	1348	260	260	F	P	F	9.5
261	83/09/17	1348	261	261	F	P	G	15.4
262	83/09/17	1348	262	262	M	P	G	18.6
263	83/09/17	1348	263	263	F	P	G	16.8
264	83/09/17	1348	264	264	M	P	G	15.9
265	83/09/17	1348	265	265	M	P	G	17.7
266	83/09/17	1348	266	266	F	P	G	11.3
267	83/09/17	1348	267	267	M	P	G	16.8
268	83/09/17	1348	268	268	M	P	G	11.3
269	83/09/17	1348	269	269	F	P	G	13.6
270	83/09/17	1348	270	270	F	P	G	16.8
271	83/09/17	1348	271	271	M	P	G	13.6
272	83/09/17	1348	272	272	F	P	G	17.2
273	83/09/17	1348	273	273	M	P	G	21.3
274	83/09/17	1439	274	274	M	P	G	12.2
275	83/09/17	1439	275	275	M	P	G	15.9
276	83/09/17	1439	276	276	F	P	G	10.9
277	83/09/17	1439	277	277	F	P	P	7.7
278	83/09/17	1439	278	278	M	P	G	11.8
279	83/09/17	1446	279	279	F	P	G	11.8
280	83/09/17	1512	280	280	F	P	P	8.2
281	83/09/17	1512	281	281	F	P	P	8.2
282	83/09/17	1512	282	282	M	P	F	10.4
283	83/09/17	1512	283	283	M	P	G	16.3
284	83/09/17	1518	285	284	M	P	G	17.2
286	83/09/17	1525	286	286	M	P	F	10.9
287	83/09/17	1525	287	287	M	P	G	14.0
288	83/09/17	1525	288	288	F	P	G	17.7
289	83/09/17	1525	289	289	M	P	G	18.6
290	83/09/17	1525	290	290	M	P	G	17.2
291	83/09/17	1525	291	291	F	P	G	19.0
292	83/09/17	1525	292	292	F	P	G	17.7
293	83/09/17	1542	293	293	F	P	G	17.7
294	83/09/17	1556	294	294	M	P	G	24.0
295	83/09/17	1556	295	295	F	P	G	13.6
296	83/09/17	1556	296	296	F	P	G	14.0
297	83/09/17	1556	297	297	F	P	F	10.0
298	83/09/17	1556	298	298	M	P	G	22.7
299	83/09/17	1556	299	299	F	P	G	18.1
300	83/09/17	1556	300	300	M	P	G	19.5
301	83/09/17	1608	301	301	M	P	G	19.9
302	83/09/17	1617	302	302	F	P	G	13.1

Appendix III. continued

ANIMAL ID	DATE (YR/MO/DAY)	LOCAL TIME	LEFT FLIPPER TAG NUMBER	RIGHT FLIPPER TAG NUMBER	SEX	AGE CLASS P=PUP Y=YEARLING J=JUVENILE S=SUBADULT A=ADULT	ANIMAL CONDITION G=GOOD F=FAIR P=POOR	ANIMAL WEIGHT (KG)
303	83/09/17	1617	303	303	F	P	G	11.8
304	83/09/17	1622	304	304	F	P	G	14.5
305	83/09/18	1058	305	305	M	P	G	19.5
306	83/09/18	1058	306	306	M	P	F	9.5
307	83/09/18	1058	307	307	M	P	G	23.1
308	83/09/18	1058	308	308	M	P	G	11.8
309	83/09/18	1058	309	309	M	P	G	18.1
310	83/09/18	1106	310	310	M	P	G	19.9
311	83/09/18	1117	311	311	F	P	G	16.8
312	83/09/18	1117	312	312	M	P	F	10.4
313	83/09/18	1122	313	313	F	P	P	8.2
314	83/09/18	1128	314	314	F	P	G	13.1
315	83/09/18	1128	315	315	M	P	G	19.5
316	83/09/18	1128	316	316	F	P	G	15.9
317	83/09/18	1128	317	317	F	P	G	25.4
318	83/09/18	1140	318	318	M	P	G	23.1
319	83/09/18	1146	319	319	M	P		
320	83/09/18	1153	320	320	F	P	F	10.4
321	83/09/18	1153	321	321	F	P	G	19.9
322	83/09/18	1158	322	322	M	P	G	27.2
323	83/09/18	1403	323	323	F	P	F	9.5
324	83/09/18	1403	324	324	F	P	G	12.7
325	83/09/18	1403	325	325	M	P	G	14.0
326	83/09/18	1403	326	326	F	P	F	10.4
327	83/09/18	1403	327	327	F	P	G	14.9
328	83/09/18	1403	328	328	M	P	G	20.8
329	83/09/18	1403	329	329	F	P	G	15.9
330	83/09/18	1403	330	330	F	P	G	15.4
331	83/09/18	1423	331	331	F	P	G	12.7
332	83/09/18	1423	332	332	F	P	G	16.8
333	83/09/18	1423	333	333	F	P	G	15.4
334	83/09/18	1423	334	334	M	P	G	19.5
335	83/09/18	1423	335	335	M	P	G	17.7
336	83/09/18	1430	336	336	M	P	G	19.5
337	83/09/18	1437	337	337	F	P	P	7.7
338	83/09/18	1437	338	338	M	P	G	13.1
339	83/09/18	1437	339	339	F	P		
340	83/09/18	1455	340	340	M	P	G	19.9
341	83/09/18	1458	341	341	F	P	G	20.4
342	83/09/18	1510	342	342	M	P	G	17.7
343	83/09/18	1510	343	343	M	P	G	15.9
344	83/09/18	1510	344	344	M	P	F	10.0

Appendix III. continued

ANIMAL ID	DATE (YR/MO/DAY)	LOCAL TIME	LEFT FLIPPER TAG NUMBER	RIGHT FLIPPER TAG NUMBER	SEX	AGE CLASS P=PUP Y=YEARLING J=JUVENILE S=SUBADULT A=ADULT	ANIMAL CONDITION G=GOOD F=FAIR P=POOR	ANIMAL WEIGHT (KG)
345	83/09/18	1510	345	345	F	P	G	16.3
346	83/09/18	1510	346	346	M	P	G	13.1
347	83/09/18	1510	347	347	M	P	F	10.4
348	83/09/18	1510	348	348	M	P	G	15.9
349	83/09/18	1510	349	349	M	P	G	19.9
350	83/09/18	1510	350	350	F	P	G	17.2
351	83/09/18	1523	351	351	F	P	G	19.0
352	83/09/18	1532	352	352	F	P	F	
353	83/09/18	1532	353	353	F	P	G	
354	83/09/18	1532	354	354	M	P	G	
355	83/09/18	1536	355	355	F	P	G	
356	83/09/18	1558	356	356	F	P	G	
357	83/09/18	1558	357	357	F	P	G	
358	83/09/18	1558	358	358	M	P	G	
359	83/09/18	1558	359	359	M	P	G	
360	83/09/18	1558	360	360	F	P	G	
361	83/09/18	1558	361	361	F	P	G	
362	83/09/18	1604	362	362	F	P	G	